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...THE IRON AGE...

FEBRUARY 25, 1937

ESTABLISHED 1855 Vol. 139, No. 8

Precedents Are Dangerous

THERE are two ways of considering the President's proposal to change the size and complexion of the Supreme Court. One is the short term view; the other is the long pull.

The speculator is interested in immediate effects. The investor looks to the future.

Both of them are alike in one respect. Abrupt changes in management in the companies whose stocks they hold are likely to make them run to cover.

We believe that most of those who favor the President's plan to remake the Supreme Court are taking the short term view. They are speculating upon the continuance of the present national management.

But that continuance is by no means guaranteed. It is not beyond the bounds of possibility that John Lewis may be our next President. And perhaps powers that Mr. Roosevelt would use beneficently might prove malignant in other hands.

Assuming that the precedent is set for changing the Court at presidential will, let us construct an imaginary scene in say, 1942, during the reign of pugnacious John the First. It is laid in the White House executive offices. Enter Executive Assistant No. 117:

EX. ASST. 117: Hey Chief, them guys on the Supreme Court have just turned thumbs down, 8 to 7, on your bill to make all steel executives rise and salute whenever the "Internationale" is played.

P.J. THE FIRST: Grr . . . , Grr . . . , Grr . . . . Tell me the names of the guys who turned me down. I'll fix them.

(Ex. Asst. 117, thereupon hands P.J. the First a list of the eight backward justices.)

P.J. THE FIRST, rising from his chair and hurling the inkwell at the cat: Grr . . . , Grr . . . , Grr. Go and take their union cards away from them.

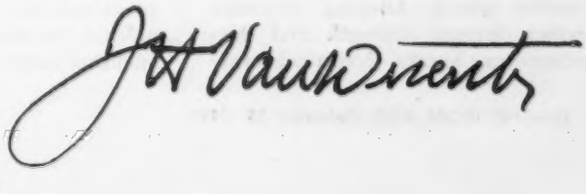
EX. ASST. 117: But your Highness, them guys haven't got no cards. The charter of the Amalgamated Union of Supreme Court Justices has not been approved yet at headquarters.

P.J. THE FIRST: Grr . . . , Grr . . . , Grr . . . . I'll fix 'em anyway. How old is the youngest of those guys?

EX. ASST. 117: The youngest, Justice Gutz, is 54.

P.J. THE FIRST: O.K. Tell Congress to pass a bill tomorrow making the age limit 50 years for Supreme Court Justices and enlarging the Court to 25 members. And let Congress know that I don't mean maybe!

All in fun, of course, and exaggerated. But it may make the long term American wonder what might happen if the power now being built up in the White House should be transferred to hands less beneficent than Mr. Roosevelt's.



HEAT EFFECT *in* WELDING

• *part three* •

Certain Alloy Steels

By Dr. W. G. THEISINGER

Welding and Metallurgical Engineer, Lukens Steel Co., Coatesville, Pa.

THIS article and its continuation in the following issue concludes the series in which Dr. Theisinger outlines the method and conclusions of a fundamental research into the variables which influence the welding of steel, with particular reference to the effect of welding heat on the parent metal adjacent to the weld. The first article, in THE IRON AGE of Oct. 15, 1936, was devoted to general objectives and methods, and the second, in the issue of Dec. 17, to the heat effect in welding five plain carbon steels. This article continues the discussion into alloy steels.

Of the elements studied, carbon exerts the greatest influence in increasing the susceptibility of the base plate to harden after welding, states Dr. Theisinger. Speed of welding, seldom taken into account, should be seriously considered when the hardenable steels are to be welded.

THE essential difference between alloy steels and plain carbon steels is that the tensile properties of the alloy steels need not be dependent upon carbon alone. Alloying elements which impart strength and ductility are highly desirable, especially if they do not confer appreciable hardening power to the steel after quenching or welding. Selection of alloying additions to the parent plate metal then assumes considerable importance for welded structures, but still more significant becomes the necessity of adopting proper welding conditions.

Referring to the second portion of this study, in THE IRON AGE of Dec. 17, 1936, page 38, we found as the carbon content of the plate metal increased, the hardening power of the steel increased. Certain common alloying additions made to steel likewise raise the ability of the metal to harden after quenching, but to a much lesser degree than carbon. The properties of these steels are due to some special elements and not chiefly to carbon. Many combinations of elements may be employed in order to obtain the desired physical effects.

Welding brings about a drastic heat treatment in the plate steel adjacent to the weld to an extent depending on the composition of the metal and the welding procedure used. Since most special steels respond readily to heat treatment it seems reasonable to expect that the welding condition should receive considerable attention in or-

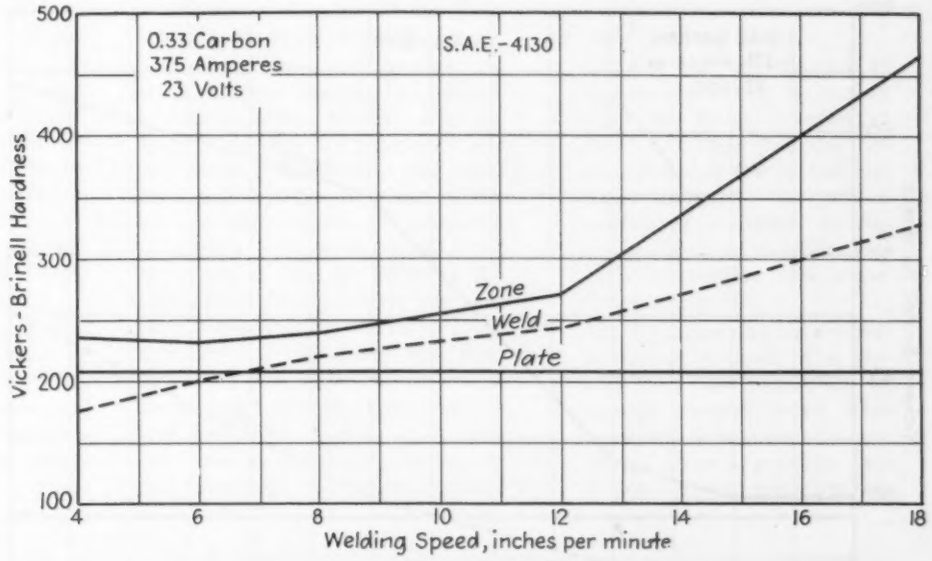


FIG. 17—S.A.E. 4130 (0.33 per cent carbon, Cr-Mo). Maximum allowable welding speed based on 100 points Brinell—13 in. per min.

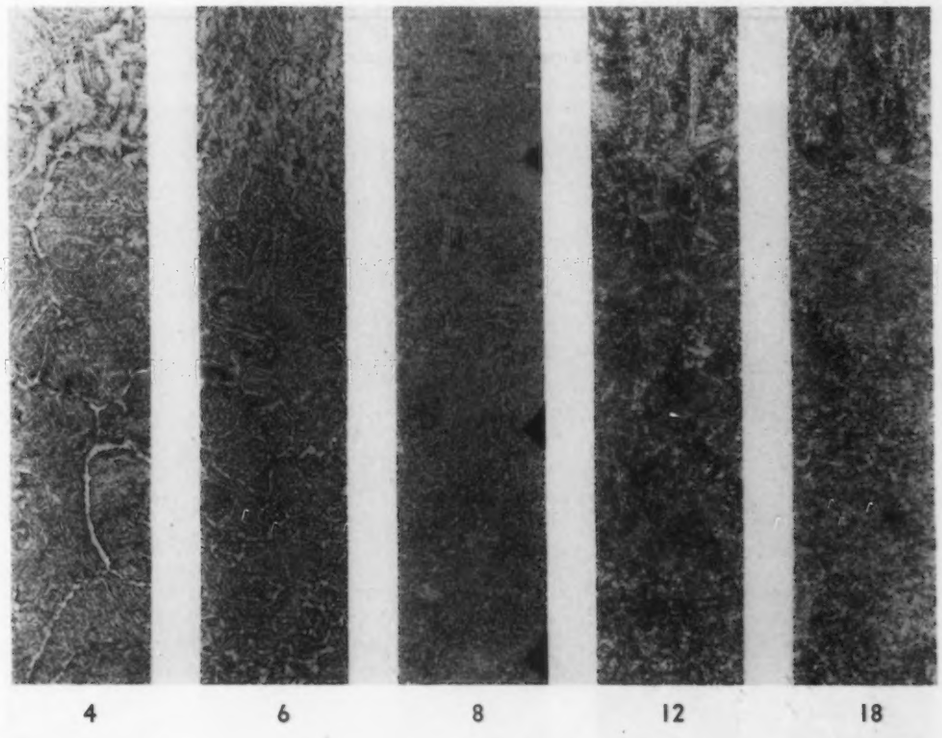


FIG. 18—S.A.E. 4130 (0.33 per cent carbon, Cr-Mo) 150x—1.0 per cent Nital. Welding speeds of 4, 6, 8, 12 and 18 in. per min. Sorbite with ferrite grain boundaries. Some troostite, and martensite at 18 in.

der to attain the minimum amount of hardening in the plate adjacent to the weld.

Eight Special Steels Studied

Not all the special elements added to steel have been included in this research. The well-known elements in varying combinations with each other would provide a tremendous program for study.

This program was confined to the examination of the following special steels:

S.A.E. 4130 (0.33 per cent C—Cr-Mo).

S.A.E. 4150 (0.52 per cent C—Cr-Mo).

Nickel Steels (0.30 per cent C—3.50 per cent Ni).

Nickel Steels (0.20 per cent C—3.50 per cent Ni).

Nickel Steels (0.17 per cent C—2.15 per cent Ni).

Cromansil Steel (0.13 per cent C—Cr-Mn-Si).

Molybdenum Steels (0.25 per cent C—0.24 per cent Mo).

Molybdenum Steels (0.15 per cent C—0.48 per cent Mo).

The samples for welding were 9 x 2 x ½ in. with a bead deposited on the top surface of the normalized plate. No machining was done on the plate prior to welding; otherwise any dissimilarity in the "fit" or tacking would no doubt introduce variables of

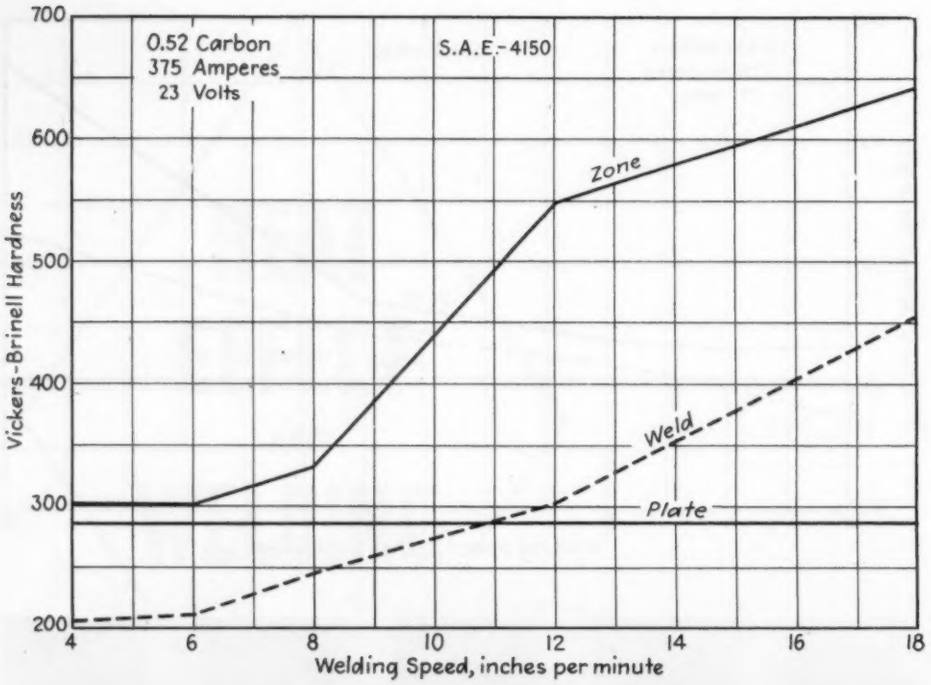


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FIG. 19—S.A.E. 4150 (0.52 per cent carbon, Cr-Mo). Maximum allowable welding speed based on 100 points Brinell—8 in. per min.

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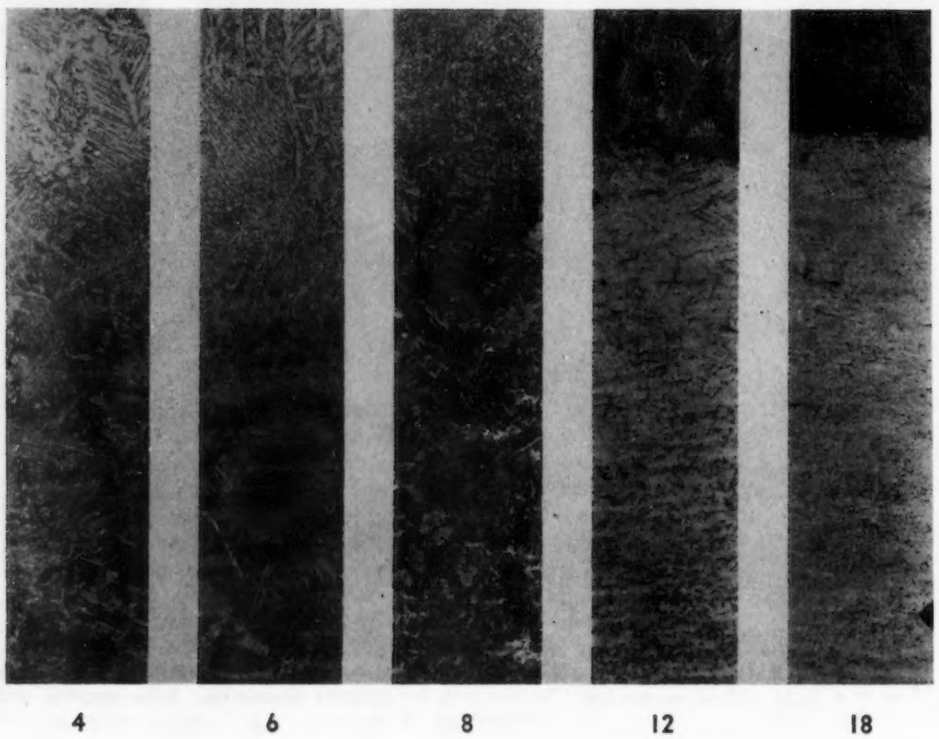


FIG. 20—S.A.E. 4150 (0.52 per cent carbon, Cr-Mo) 150x—1.0 per cent Nital. Welding speeds of 4, 6, 8, 12, and 18 in. per min. Sorbite and troostite; completely martensitic (12 and 18 in.).

unknown proportions. An alternating current automatic welding machine was employed in depositing the beads at 375 amp. and 23 volts. The various welding speeds used were: 4, 6, 8, 12 and 18 in. a minute travel of the welding arc.

Several steels were welded only at the three intermediate speeds as it was not possible at that time to obtain sufficient material of the same analysis. It required at least three specimens for each welding speed since a trial piece was required to establish the wire feeding mechanism and arc length for each particular run. Then duplicate hardness specimens were necessary to check the results obtained.

Primary Object of the Research

The primary object of the research was to ascertain the hardness values on the cross section of the plate. For this reason the bead itself was not so important

and was sacrificed somewhat so that the actual response of the plate might be determined. In practice, the proper type of electrode wire would be selected for each grade of steel used; in the special steels this would undoubtedly be some form of covered rod. This brings into play another variable of almost limitless proportions namely, flux, with its many varieties of composition.

In order to carry out this program with the least number of unknown factors present to influence the results, a bare electrode wire was used (5/32 in. in diameter). This also afforded an opportunity to analyze the percentage of dilution of special elements in the weld by adding filler metal containing such elements only as impurities in minute amounts. Such work has not been completed, but the several results obtained on the 3½ per cent nickel steels show that the bead is approximately 1.75 per cent nickel throughout, with the exception of the top of the bead where the percentage of this element is usually lower.

The hardness test specimen was taken at a distance of 2 to 3 in. from the center of the crater or finishing end of the 9-in. bead. The cross section of the sample was polished for microscopic study and etched with 1.0 per cent Nital. The Vickers hardness impressions were made 0.02 in. apart through the hardened zones and at 0.05 to 0.10 in. apart in the areas outside the affected zones. The hardness values obtained were plotted in graphic form as described in the previous articles of this series.

The graphs appearing on these pages show the "hard zone" which is the hardest value obtained from that particular sample; the "weld" curve indicates the figure which is representative of the deposited bead; and the "plate" line remains the same for a sample of the same steel, as this point is taken in the untreated plate.

Problem One of Overcoming Metallurgical Damage

It is not the purpose of this research to recommend or condemn any type of steel whether it be carbon or alloy steel. While many factors are of interest to the designer, from the standpoint of welding metallurgy, the problem becomes one of overcoming the metallurgical damage of the plate brought about by welding.

Certain facts will become obvious as the charts and photomicrographs are studied. For example, compare the plain 0.33 per cent carbon steel with any alloy steel included herein about which similar information is available. Comments have been made (THE IRON AGE of Dec. 17, 1936) to the effect that the plain 0.33 per cent carbon was readily weldable. Near the close of this third and final article of this series, the effect of stress relief will be shown for the 0.33 per cent carbon steel. The need for stress relief, insofar as this treatment has benefited either the hardness or microstructure of the plain carbon steel is practically negligible. This is not true of the steels of higher hardening power. However, bear in mind that the subject of residual stresses does not come within our scope in this work.

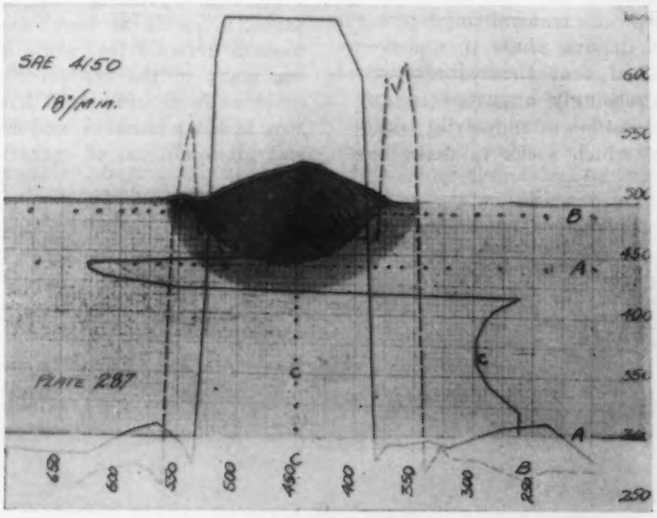


FIG. 21—S.A.E. 4150 (0.52 per cent carbon, Cr-Mo) 4x. Welding speed of 18 in. per min. Hard zone 642 Vickers-Brinell.

Carbon in Combination With Special Elements

Returning to the alloy steels we find that carbon in combination with special elements increases the tendency toward air hardening in the section of the plate adjacent to the weld. Carbon content should be kept low so as to hold the structural constituents to a low order.

Prof. Albert Sauveur in "The Heat Treatment of Iron and Steel" formulates a few propositions from Guillet's theory of the structure and properties on the slow cooling of some ternary steels.

(1) On the introduction of a special element in carbon steel the latter remains at first pearlitic, but as the proportion of the special element increases, the carbon remaining constant, it becomes first martensitic and then austenitic, and sometimes cementitic.

(2) By increasing the amount of carbon present in a special steel, the proportion of special element being kept constant, it is generally converted from a pearlitic into a martensitic condition or, if already martensitic, into an austenitic condition.

(3) The greater the amount of carbon the smaller the proportion of the special element needed to cause a structural transformation, as for instance pearlitic into martensitic or martensitic into austenitic.

(4) The greater the amount of the special element the smaller the proportion of carbon needed to cause a structural transformation.

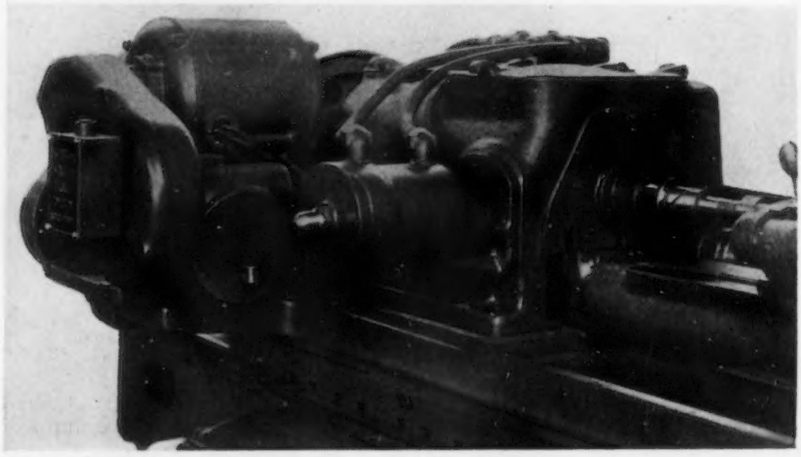
Although the above deals with higher percentages of chemical elements than is contained in the low alloy steels with which we are concerned, we have drastic quenching of the heated metal in the welding process as brought

(CONTINUED ON PAGE 115)

Limitations of Present Industrial D

IT is not to be denied that, from the economic point of view, there are distinct limitations to the effective use of all present methods of transmitting power from a driving shaft to a driven shaft, and that these limitations are increasingly apparent in any present *system* of industrial transmission which seeks to make the power input to the system usable to the highest possible degree.

It has been said in this series of discussions that individual motor drive, while yielding many advantages, is costly at best; and that modern group drive, while retrieving many of the expensive wastes inherent in an individual drive system, is not a panacea, and does not suit all conditions of operation. It is, as a matter of fact, a serious mistake to decide offhand, before all the facts in a given situation are thoroughly investigated, that one system or the other is best for the plant in question. Studies should be made not only by departments in the plant, but by groups of machines in each department, with due consideration being given to production factors, material han-



AT LEFT

ILLUSTRATING the tendency to get away from the limitations of cone or step-pulley belt drives this compact lathe drive is powered with a 1 hp. Wagner Electric two-speed constant horsepower induction motor, totally inclosed. For roughing out operations the motor is run at 1750 r.p.m.; for the lighter finishing cuts it is operated at 3500 r.p.m.

o o o

BELOW

BUILDING construction has imposed the principal limitations on the drive problem here. An upper floor, a narrow bay and a low ceiling make a combination that is almost impossible to lick except with individual motor drive. Photo courtesy Westinghouse Electric & Mfg. Co.

al Drive Systems

By FRANCIS JURASCHEK
Consulting Editor, THE IRON AGE

dling factors, motion economy factors and the general questions of lighting and safety, as well as to the obvious factors of investment cost, operating cost and maintenance cost.

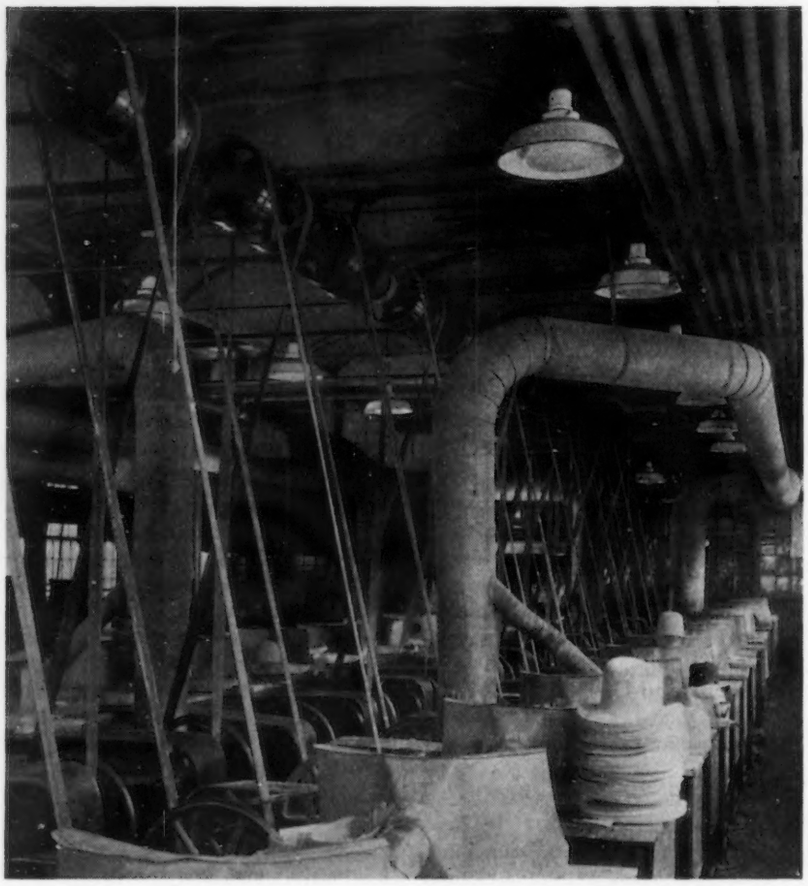
Some of the most common limitations to be met in determining the right type of system which may be most profitably employed may be listed as follows:

1. **The Power Requirements of Individual Machines.** In general, machines which require 20 hp. or more for operation, and which impose a fairly steady load on the motor of more than half the rated motor horsepower, are usually best driven by individual motors. Under most industrial conditions, group drive motors are best mounted overhead. Since very large motors are unwieldy to replace quickly in case of failure, overhead mounting tends to limit the motor size to 100 hp. or less—more frequently to about 50 hp.—and thus the effective grouping of machines which take large loads is made difficult unless means are devised to locate the transmission system under the floor, or just above the floor in back of the machines. Where several machines are located closely together, each developing large loads of highly intermittent character, it is often possible to combine them in a group for the purpose of averaging high peak loads, cutting power costs and improving power factor. Such a problem requires very careful designing of the transmission system to secure low operating and maintenance costs. On the other hand, machines requiring smaller horsepowers, particularly when their loads vary widely, may usually be grouped advantageously in order to improve both the power factor and the electrical efficiency of operation.

AS the fifth chapter in the series on The Economics of Industrial Power Transmission, Mr. Juraschek draws attention to many obvious limitations in present drive equipment. The first article appeared Dec. 19, 1936.

2. **Character of Plant Operation.** The general character of operation of the plant may well have an influence on the question of individual vs. group drive. In a shop which runs at maximum capacity throughout the year, producing the same product all the time, the grouping of drives by production units presents many economical advantages. To a somewhat lesser degree, the shop which runs at maximum capacity two to three shifts per day, at one time, then practically shuts down for a period, can be operated economically with group drive systems provided those systems are carefully adapted to logical production units of machines. Where, however, the character of the work varies widely, either from day to day or from month to month, as in most job shops, and the set-up of work on each machine is not uniform over successive periods, it has been found that individual motor drive presents a flexibility of operation which more than counterbalances the usual operating ad-

PART of steel pulley department, Dodge Mfg. Corp., Mishawaka. A single motor operating three main shafts and one countershaft drives fifteen machines at a considerable saving over individual motor drive. Lighting and general working conditions are practically ideal.



ABOVE

IN a large hat factory batteries of machines are placed back to back, with the belt drives in between, out of the way, arranged in small groups for production control. This set-up was intelligently planned to reduce unit power costs to the absolute minimum. Photo courtesy American Pulley Co.

o o o

vantages of the group drive system. This is particularly true when the variations of work make necessary a frequent change in location of machines, or as in the automotive industry, frequent change in models cause the scrapping of whole departmental machine layouts to make way for new production machines.

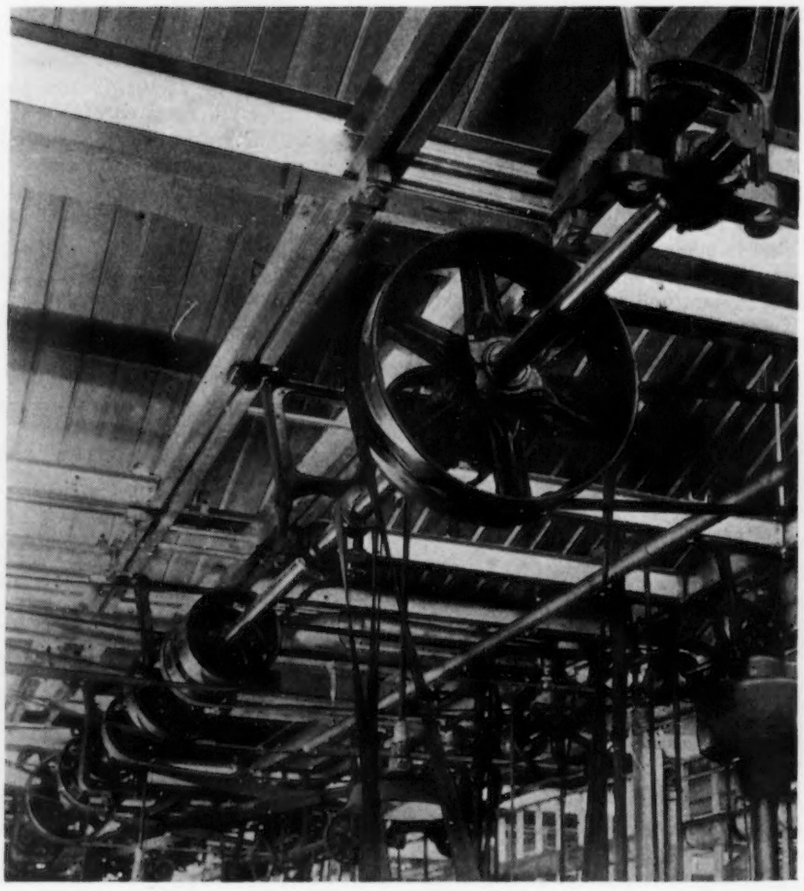
3. **Materials Handling Considerations.** Oftentimes the necessity for overhead crane service, or of conveyor systems, as well as certain types of obstructions peculiar to the construction of the building, will dictate the adoption of individual motor drives, even though it is possible nowadays to devise group drive systems with the transmission equipment mounted under the floor, or on the floor alongside the machines, leaving space clear for materials handling systems. The rigidity of such under-the-floor or on-the-floor transmission systems must be weighed against the advantages of individual motor drive in such cases. At best a group drive system is not as *flexible* as individual motor drive, but the attainment of that flexibility must be had at an increased cost for electrical power distribution.

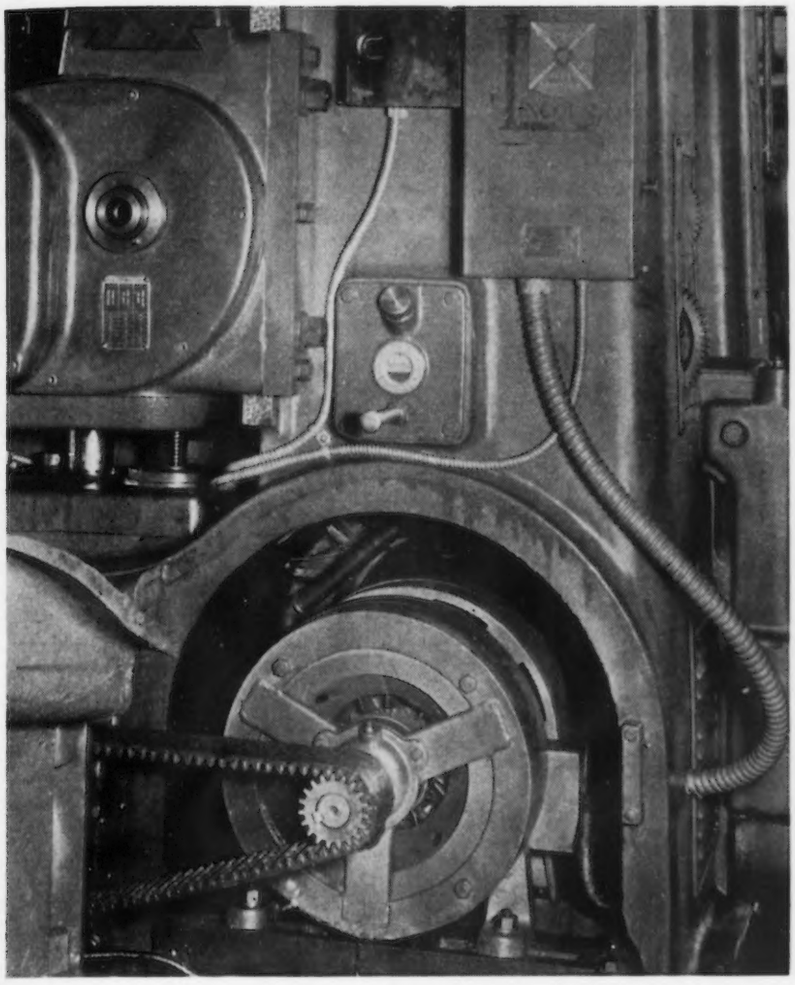
4. **The Concentration of Machines in a Given Area.** Where machines are widely separated the limitations of group drive are obvious, and individual motor drive is usually indicated. Where machines are concentrated closely group drive becomes an important economic factor. Here again a study of production flow may indicate that machines now separated may

o o o

BELOW

HERE the hanger set-up of this modern group drive is extremely flexible. The hangers may be shifted with ease along the line of the shafting; the channels supporting the hangers may be moved easily at right angles to the line of the shafting. Machines may be located or re-located anywhere on the floor. Photo courtesy S. K. F. Industries, Inc.





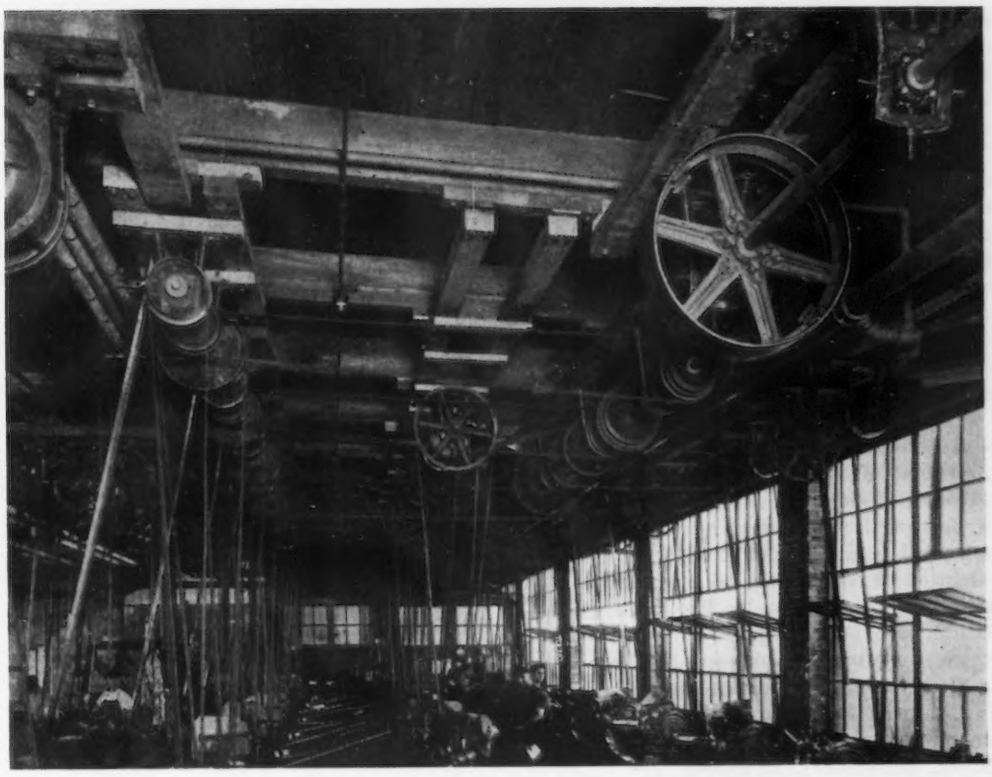
ABOVE

COVER plate opened to show a Lincoln Electric motor built in the body frame of a modern milling machine. Note also the chain drive arrangement which is likewise concealed when the cover plate is shut.

o o o

AT RIGHT

WHILE these group drive lineshafts are of modern type, supported in anti-friction bearinged hangers, the hangers can only be moved to new locations to accommodate possible changes in machine locations, with difficulty and at considerable expense. Photo courtesy American Pulley Co.



logically be located close enough to each other to make group drive by production units possible. Unless the character of the work demands wide separation of the machines a study of the effects of grouping should be made anyway from the standpoint of effecting greater motion economy.

5. **Speed Variation Requirements of the Machines.** Sometimes the requirements for machine speed variation may determine the choice of a drive system. With individual motor drive step-by-step speed variation may be obtained by multi-speed a. c. motors, and stepless speed variation by slip-ring or brush-shifting a. c. motors, shunt-wound d. c. motors, mechanical variable speed transmissions, or a. c. squirrel cage motors with inbuilt variable speed transmissions. With group drive methods step-by-step speed variation can be obtained by pulleys and/or countershafts, and stepless speed variation by mechanical variable speed transmissions. Choice of the most suitable means for any situation will depend on the conditions of the service to be met, and will be influenced by the comparative cost of either system.

6. **Machine Mobility Requirements.** Although this has been touched upon above, it should be

listed separately as a limiting factor in group drives, for despite the comparative ease which the modern rectangular steel stringer system affords to the problem of shifting both machine and transmission locations, machines equipped for individual motor drive are still capable of being moved to new locations more easily. This is particularly true when, in the group drive system, countershafts are employed.

7. **Production Schedule Delays Due to Breakdowns.** In spite of the fact that great improvements have been made in recent years in design and construction of electric motors, with consequent longer life and more freedom from the breakdowns of former days, a certain amount of trouble with electrical equipment is almost inevitable. To judge between the merits of one transmission system and another on this point is a matter which depends largely on the plant manufacturing set-up. Motors in the sizes generally used for group drive are apt to be more rugged and long-lived than those used for direct motor drive. This is not always true, of course, since even small motors are being built now to very rigid standards and specifications. Yet, because of the fact that, when properly selected for the duty, group drive motors are never subjected to serious overloads, while the direct drive motor, particularly such as are used to drive metal cutting tools, may and frequently do meet this condition, experience shows that breakdowns in service are found much more frequently in the individual motor drive system. The effect of such breakdowns on the production schedule must be judged by the time required to get the machine back into service, and the result of the interruption to the work in its relation to the output of the machine which has temporarily stopped functioning. With group drive the breakdown of the group motor is much more serious than with an individual driven machine, since the work of many machines instead of but one is brought to a standstill until repairs are effected. This condition is of infrequent occurence, however, because in the very nature of group drive the factors which cause most breakdowns tend to disappear in the general levelling of peak loads which the system promotes. In a group of machines, momentary increased demands for power on one machine, due say to dull tools, oversized or tough stock, or stiffness of the machine because of recent overhauling and replacement of parts, will almost invariably be balanced by lessened power demands on the other machines in the group. With identical machines working on an identical product, abnormalities of power may be general in effect, and will be more apt to cause strain and possible interruptions in production than when the machines in the group are merely related in function and do not do the same work.

With a number of machines combined properly in a group the cyclic variations in the power demands of each machine tend to cancel out. The larger the group the more complete is this evening of the resultant load, and consequently the more trouble-free becomes the operation of the system. It has been estimated that in well-organized plants where adequate supervision and maintenance service is had, delays due to breakdown of motors need not run to more than one-half to one hour per month per hundred group drive motors installed. The failures per hundred individual drive motors in similarly run industrial plants seldom run to less than three times these time delay periods, for replacement or repairs.

8. **Number of Machines Which Can Logically Be Grouped.** When only a very small number of machines can be grouped logically, driving them in a group means sacrificing one of the most important reasons for using group drive —the saving in total installed motor horsepower based on the consideration that the maximum power demands of all machines do not occur at one and the same time. For instance, with only three or four machines in the group, it cannot be assumed that most of them will not "get in step" simultaneously on peak loads fairly frequently, and thus cause stalling of the motor. This would be particularly true if the individual machine loads fluctuated a great deal. If the group under such circumstances cannot be increased to say double the number of machines it is wiser to consider either individual motor drive, or a much larger group drive motor capable of handling the "in-step" peak loads. On the other hand, where the nature of the machine loads is intermittent and sharp peaks occur frequently enough to make the use of individual drive motors of reasonable ratings troublesome, every effort should be made to form large groups of machines, even though the size of the group drive motor has to be several hundred horsepower.

No Universal Rule

The large amount of industrial transmission modernization work which has been undertaken in the past few years simply confirms the statement of Robert Drake in 1932 that "It is unusual to find a plant where a careful study of the economics of the situation as well as manufacturing and production considerations point to an installation either completely group driven or completely individually driven. After eliminating those departments where one or the other type of drive offers definite and considerable advantages from a manufacturing standpoint, there remains a considerable portion of the plant where one method will give just about as good results as another, if both are planned with equal intelligence. It is in the choice of drives for these portions of the plant that economic considerations should be most carefully weighed."

In brief, there is no universal rule that can be applied to the problem. All factors must be carefully weighed in each situation, and power transmission must be tailored to fit each case if the utmost results are to be obtained in the effective and economical use of power. In particular the limitations of each system of drive must be held in mind, for it is these limitations which present the major problem of application.

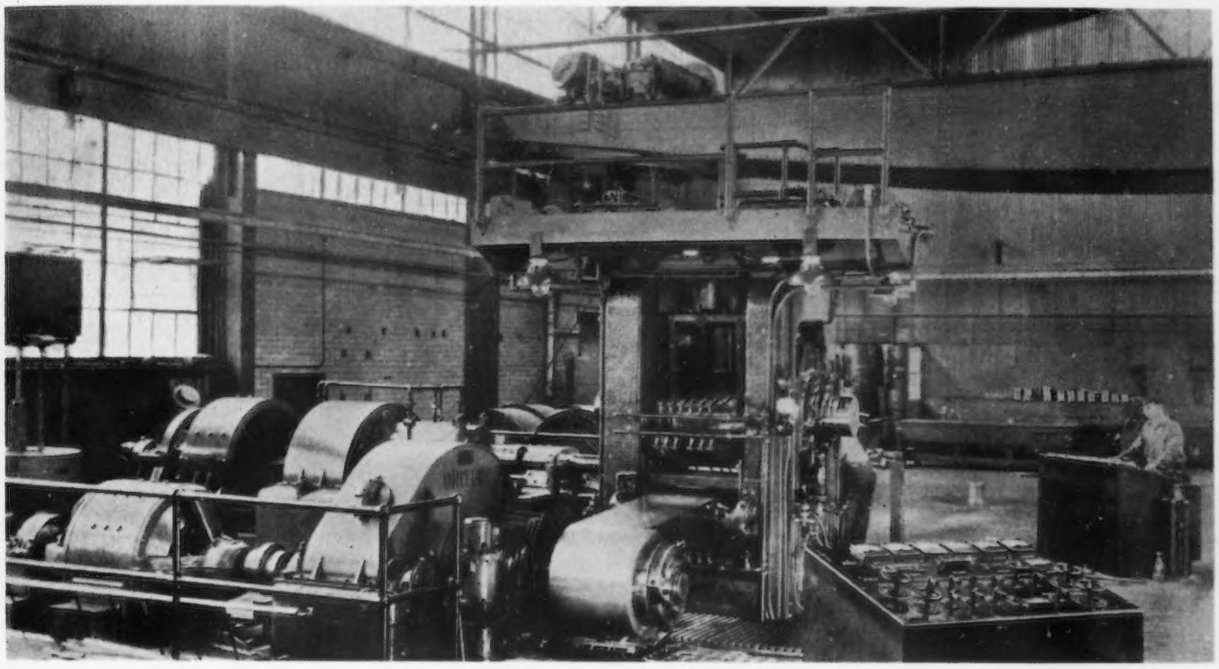
In addition to the limitations which have been outlined above with respect to the *systems* of power transmission, there are numerous other limitations which apply more particularly to the various pieces of equipment used in a power transmission system. Although space prohibits a detailed discussion of everything of this nature, the following outline may be considered useful as an indication of the line along which improvements to present equipment must be sought to bring any method or system of power transmission to its fullest effectiveness:

Motors. The squirrel cage alternating current motor is, without

doubt, the most widely used type of motor in American industry. It has a wide range of usefulness, and is relatively cheap. But it is not a highly efficient electrical instrument. It develops its best efficiency at full load. When not fully loaded the efficiency falls off rapidly, and the power factor declines even more rapidly. All plants must be over-motored, since starting or peak loads are always greater than normal running loads, and since all machines are not operating all of the time. In a plant where many small individual motors are used, the combined electrical efficiency is low, and the power factor abnormal. In a plant using group drive systems, both these factors are largely compensated for, but never completely. Group drive systems may often raise the power factor of operation to a satisfactory point so that no corrective equipment is needed to secure economical operation. With individual drives corrective equipment is almost always necessary. While it is true that unity power factor motors may be used, they are expensive as compared with squirrel cage motors, and either synchronous motors or power factor condensers cost even more. There is need for a type of motor as relatively low in cost as the squirrel cage type for ordinary machine driving use, which will operate at higher efficiencies at three-quarters or half load, and which will enable the power factor to be held around 80-85% in the average industrial plant.

Belting. More than three quarters of the leather belting now on the market is distinctly inferior in quality. Less than 20 per cent of a hide can be used for good quality leather belting, and even this must be tanned carefully, the tannage varying with the service to which the belt is to be put, and the strips assembled into the finished belt with care. There is a crying need for a set of standards to be set up for leather belting, since mere inspection rarely tells the purchaser anything about what he is buying. The present lack of system in grading and marking belting of all the different belting manufacturers means nothing, and the only safe recourse for the purchaser is to buy from a house with a reputation for fair dealing, and to keep careful records of the life and service of each belt he buys. The old adage "caveat emptor" still holds with a majority of leather belting manufacturers, unfortunately.

Rubber and composition belting has made enormous strides in recent years. The markets for rubber belting have been widening continually until today they may be used with great satisfaction almost everywhere a leather belt may be used. The big rubber manufacturers are constantly spending huge sums on research with the aim of improving their belting; very little similar research is being done by the leather belting manufacturers. Both leather and rubber belting should be developed to secure greater coefficients of friction between the belts and pulleys, to give longer useful life, to stretch less and to "creep" less.



A REVERSING cold-strip steel mill can only be driven effectively by adjustable speed direct current motors. As shown, the 10" x 26" x 24" 4-high mill is driven by a G. E. 500/800 r.p.m. 500 hp. motor; the two reels each have a 150 hp. 300/1100 r.p.m. G. E. motor.

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Shafting. It is a far cry from the three and four inch shafting used by our grandfathers to the light, high-speed steel shafting of today. But there is still a great deal of room for improvement. The use of many of the special, light alloy steels now available as the result of recent metallurgical research would cut down still further the weight of shafting, and thus reduce frictional loads.

Hangers. It seems strange that no one has as yet brought out an aluminum alloy shaft hanger. It is at least a two man job today to mount a hanger, or to change its location to a new position in the shop. There is no reason why an aluminum alloy hanger of at least

(CONTINUED ON PAGE 124)

The Chuck Keeps Step In the Modernization March

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By L. M. WAITE

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MODERN machine tool practice provides a severe test of stamina. Particularly is this true of work-holding devices. The chuck, for example, stands between two fires; the power of the machine spindle and the resistance of the cutting tool. To use a popular expression, it must be able both "to take it and to dish it out."

In this article, Mr. Waite gives us an insight into the matter of chuck modernization, as exemplified by the shop practice of a well-known maker of these machine appliances.

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MODERN developments in material cutting practice have put new responsibilities upon the chuck. Today, it must be a thoroughly engineered unit into which is built the accuracy required in multiple parts production and ability to keep pace with increasingly severe requirements presented by modernized machine tools.

This article, while based upon the methods of the Skinner Chuck Co., New Britain, Conn., is not an endorsement of any particular type of chuck. Its purpose is to record significant progress within a subsidiary machine tool industry in meeting problems of work-holding under the new capabilities of cutting tools and the resultant condition of stresses, speeds and precision specifications.

Facilities at the Skinner plant now cover operations in machining of solid forgings, steel castings, standard grade gray iron castings, and iron castings alloyed with nickel, chrome or molybdenum as basic materials for chuck bodies. The company, however, dates from the days when all chuck bodies were ordinary gray iron castings.

In a new arrangement of shop facilities, heat treatment is regarded as the most important operation in manufacturing, particularly in the chucks of heavy-duty type. As in much other machine tool procedure, technical cooperation with the steel maker has been the basis of developing materials having specific characteristics suitable for the gaining of several advantages. Details of this preliminary steel research may be passed with the comment that any steel, held by its makers to be suitable, is eligible to prove its worth in elimination tests. In such cases, the possibilities of cost reductions in manufacture are carefully weighed against material prices.

Parts of the company's new heat-treating department are shown in Fig. 1 and 2. Special spaces are provided for laying out work for heat treatment. The equipment includes a large electrically controlled furnace, regulated by instruments, and a controlled electric furnace for first and second re-heats. Drawing is done by hot air with a range of 350 to 1200 deg. A quenching bath of oil is used, with the oil tank of sufficient size and capacity to take care of the largest load handled by the carburizing furnace. In the oil bath, the oil is surrounded by a water jacket in which is a motorized agitator, operated through a thermometer control. In light case work, where only a few pieces may be wanted, but quickly, a standard cyanide or salt bath is used.

Since carbide tools are used throughout the shop, the heat-treating room provides for brazing bits on low-carbon shanks. For this work, a pre-heating furnace, electrically controlled, is used in conjunction with a high-speed furnace.

Development of heat treatments has included certain clay and sand methods, featuring the use of alloy caps, for case control at specific spots where it is desired to retard carburization. In connection with the retarded case thus obtained on working surfaces, it is said that in final heat treatment, not only is the desired wear resistance obtained, but that there is also an increase in material strength amounting in some instances to 40 to 50 per cent.

Heavy-duty forged chucks, hogged from the solid, and having fine-grained structure, are a recent new standard line. The assembly includes special steel bodies, jaws, scroll plates and pinions, all heat-treated and free from material imperfections, under a series of 100 per cent inspections. Typical chuck types are shown in Fig. 3 and 4. In standard sizes, chucks now run up to 36 in. in diameter and well onto 1000 lb. in weight. Illustration of new heavy-duty forged chucks is afforded in recent manufacture of a 28-in. independent chuck weighing 850 lb. for

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FIGS. 1, 2. Views in the new heat-treating department at the plant of the Skinner Chuck Co., New Britain, Conn., where heat treating is held to be the most important operation in the manufacture of modern work-holding chucks.

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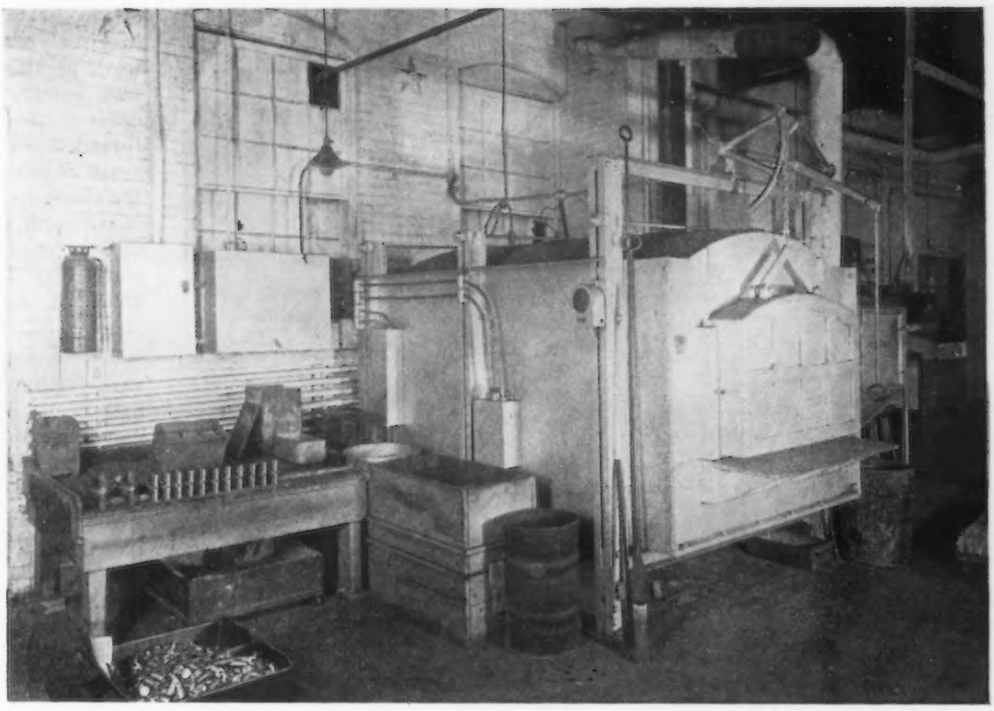
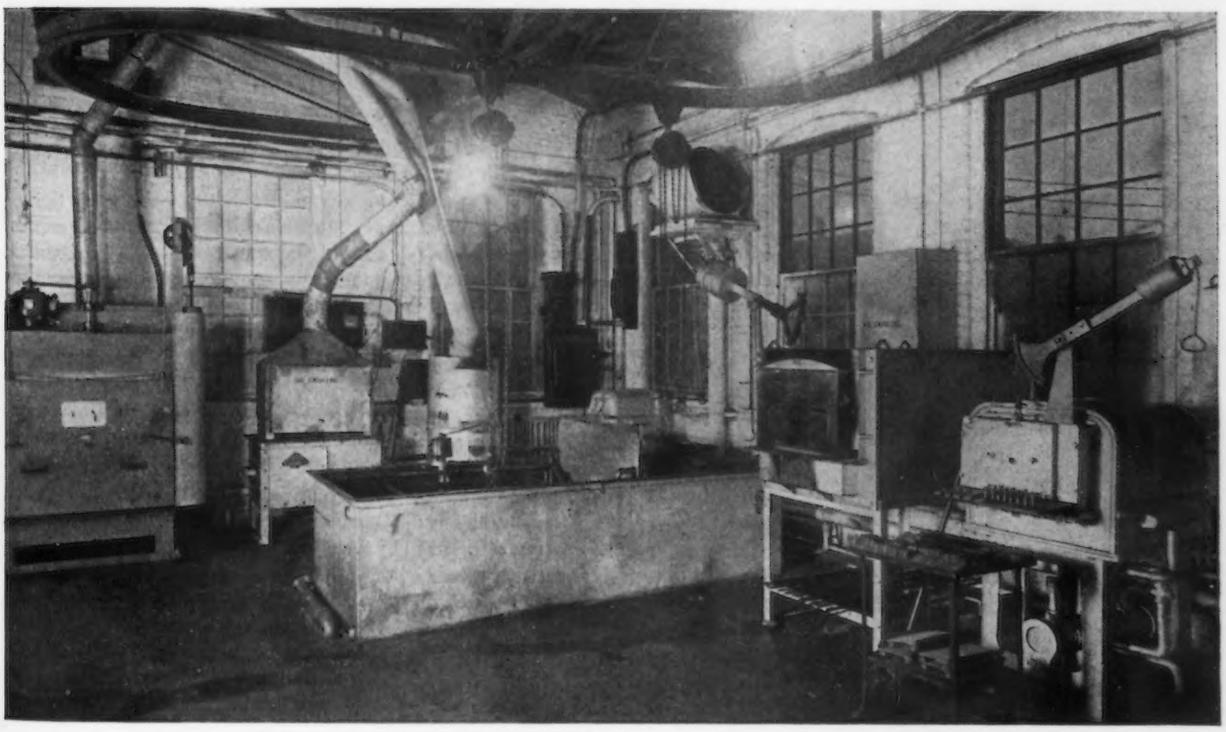
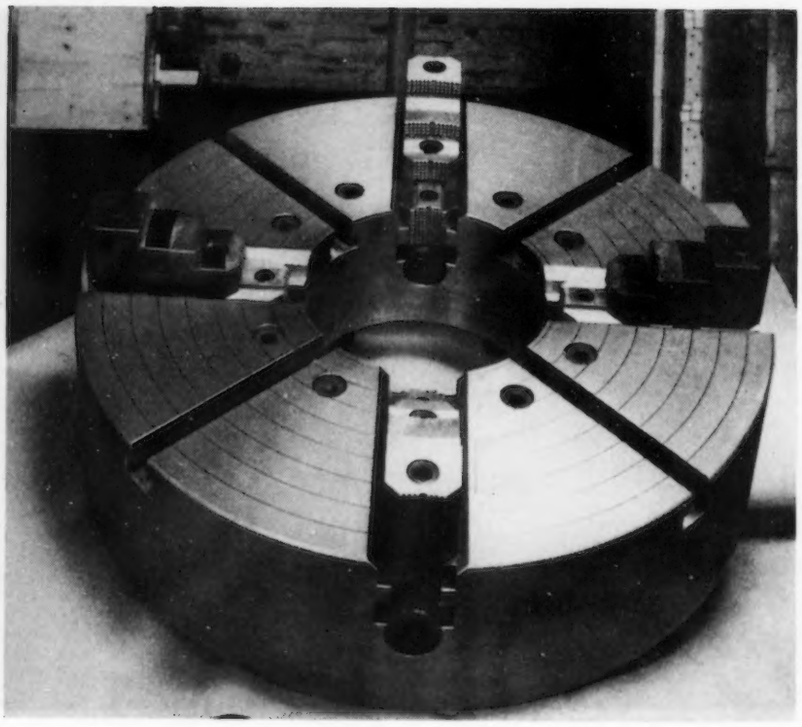


use on Warner & Swasey turret lathes, Fig. 3.

Inspection breakdown tests similar to those found in automotive practice have been evolved.

For example, for the purpose of constantly investigating competitive steels and for checking continued reliability in selected steels, a torque-testing machine of special design provides for recording resistance to breakage up to 100,000 lb. On this machine, actual tests have shown up to 97,000 in. lb. Parts such as wrench shanks, jaw screws, pinions for scroll chucks, etc., may be tested separately or a finished chuck may be mounted on the machine table for unit testing of all component parts under operating conditions, but with extreme stresses. An impact screw-thread testing machine, Fig. 5, in connection with Rockwell hardness-testing equipment, is employed to assure that thread-impact resistance and freedom-from-brittleness specifications are met while work is in process. These specifications call for practically 3 to 1 greater resistance as against previous screws, 24 in. to 30 in. drop as against an 8 in. to 10 in. drop of a 5-lb. weight. In gaining the hardness, wear and





ABOVE

FIG. 3. Forged steel body, heavy-duty independent chuck, weight 850 lb., diameter 28 in., for use on Warner & Swasey turret lathes.

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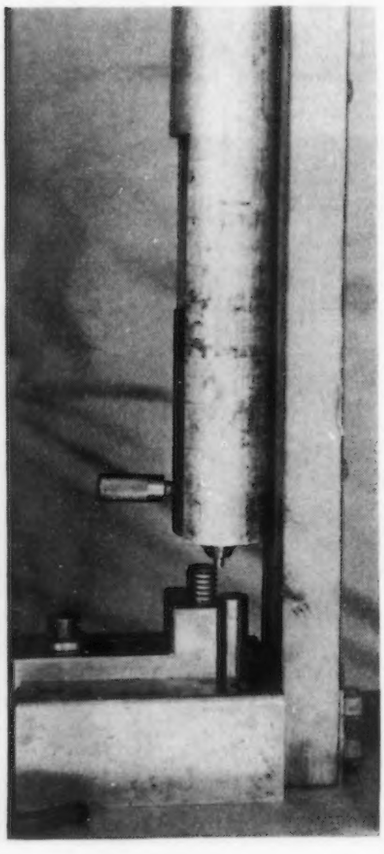
BELOW

FIG. 5. Impact-testing device for brittleness and strength of thread. Using a 5-lb. weight and a high-speed steel drive pin, a ft.-lb. impact is measured.



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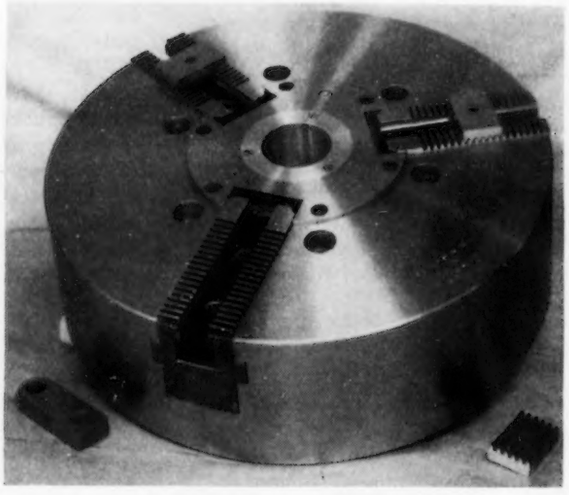
AT RIGHT

FIG. 4. Serrated, 3-jaw type, power chuck, equipped with top-jaw keys, two of which are shown in position, and one at the right of the chuck. These attach to top chuck jaws through a top-jaw nut, shown at the left.



of scroll threads. Prominent metallurgists interested in research work at this plant have reported test results indicating that the cross section of a tooth which is threaded at right angles to the grain of selected steels, is stronger for chuck use than a thread which is cut with the grain. Capitalization of these indications, as they pertain to further chuck betterment, is still in a progressive stage.

The working out of a special wear-testing machine gives in its first model, Fig. 6, the promise of increasingly accurate determinations of alloy wear prevailing under different conditions of tensile strength. This testing is said to have yielded valuable information. In this connection, a method for the lubrication of all moving chuck parts has been devised and is said to hold possibilities for a major development in the use of chucks.

high torque objectives, it is now production practice to employ the higher alloy materials in screws, rather than to carburize the lower grades.

A hydraulic pump unit, which with a gage is mounted on a machine base and having a heavy spindle assembly for work holding, is utilized for testing the jaw and scroll threads for brittleness and impact resistance. Such testing provides material comparisons as well as a check on manufactured parts. In the former case, it is interesting to note that strength, as controlled by carburization depth, often varies as much as 40 to 60 per cent in the shearing off

Manufacturing machines, equipment, practices, and operation methods employed may be of interest as indicating problems which are encountered by the chuck builder. Some of these are briefly referred to and illustrate the type of study under way in the chuck industry, for meeting new work-holding requirements.

Heavy-duty forged chuck bodies are turned on heavy Warner & Swasey, Jones & Lamson, and Gisholt turret lathes. Particular attention is regularly given to maintenance of extreme cross-slide accuracies for assuring precision in the chuck seat, which becomes

(CONCLUDED ON PAGE 122)

Colloidal Graphite As a Die-Casting Lubricant

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By WILLIAM JENNINGS

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THE lubrication of die-casting mechanisms that are subjected to high temperatures is oftentimes a difficult problem, inasmuch as most lubricants either lose their viscosity or chemically decompose under high heat. Experience has shown, however, that of all lubricants compounded for the purpose those containing colloidal graphite are capable of overcoming this difficulty and similar problems in the high temperature field. Not only do the graphoid surfaces formed by such a material possess a low coefficient of friction and act as a protective coating on moving parts, but they are also resistant to oxidation and are incombustible at temperatures below 600 deg. C. A consideration of this material from the standpoint of actual die-casting procedures follows.

The word "die-casting" is limited properly to those parts produced from metal molds or dies, the exerting forces being either gravity or the pressure from hand-operated plungers, pneumatic and hydraulic devices. This pressure is maintained until solidification is complete. The dies are usually made from some specially heat-treated alloy like chrome-vanadium steel, and are applicable for casting the yellow metals as well as those alloys having a zinc, tin, lead, or aluminum base. One of the reasons for the use of such metal dies is to obtain within narrow limits a well-finished and solid casting that requires little or no machining. Although accurate lathe methods produce the required smooth finish, the purpose of the die, however, is somewhat defeated if its surfaces are not treated with a non-gumming lubricant or parting solution like an aqueous dispersion of colloidal graphite, as, for example, "Aquadag."

In practice, the dies or cores are first dipped into a sodium hydroxide solution in order to cleanse them of any absorbed grease-like substances. Where the parts requiring treatment are too large for immersive purposes, gasoline is brushed over the surfaces to be cleaned. The concentrated colloidal graphite product as commercially sold is then diluted with water to the proper consistency and worked over thoroughly to eliminate any agglomerates. The three main methods of coating a mold with this material are spraying with such devices as the De Vilbiss gun, dipping into prepared baths, and swabbing with a brush, listed in the order of their most efficient and economical use. Several coats are initially applied in order to obtain the proper metal impregnation or to form the so-called "graphoid surface" that enables the free and rapid flow of metal essential to well-formed castings. The surface thus formed is then polished whenever possible. In some instances the graphite deposit may function better if the mold is heated to a temperature above the boiling point of water, say 125 deg. C. This temperature, however, should not be so high as to make the water flash and dislodge the graphite particles. Following the initial treatment with the graphite material the frequency of subsequent applications depends upon the speed of production and the difficulty of removing the cast objects, both factors of which are determined by the operator.

A mold and core wash applicable to general conditions consists, it is said, of one part (by volume) of concentrated graphite to ten parts of distilled water. For temperatures around 400 deg. C. one-fourth part by volume of sugar or glucose is added to the above solution. For work up to 700 deg. C., 6 per cent of heaviest density commercially pure sodium silica is recommended, while an approxi-

(CONTINUED ON PAGE 82)

NEW Officers Inducted—Medals and Honors Announced — Special Lectures and "Experience" Meeting for Students—227 Technical Papers Presented on Metallurgical, Mining Subjects, and Production and Use of Oil and Industrial Minerals.

2000 A.I.M.E. at New York

WITH almost every conceivable metallurgical and mining subject covered in over 200 technical papers, with a multitude of special features gaged to attract both the practical and the theoretical engineer, with the serious aspects of the meeting set off by attractive entertainment features and plant visitations, there is little doubt but what the 147th meeting of the American Institute of Mining and Metallurgical Engineers, held in New York, Feb. 15-19, was one of the most successful in the association's history. Registration of members and guests at the Engineering Auditorium for the five-day period totaled 2000, the best turnout on record, which is a reflection in part of the attractive program offered and, also, a probable improvement in the financial status of many members.

The annual dinner and reception of the A.I.M.E. was held on Wednesday evening, Feb. 17, in the Grand Ball Room of the Waldorf-Astoria Hotel. John M. Lovejoy, retired as president of the institute, and Rolland C. Allen was introduced as president for 1937. Awards and honors announced at the dinner were as follows: the William Lawrence Saunders Medal to Erskine Ramsay; the Anthony F. Lucas Medal to J. Edgar Pew; the Certificate of Honorary Membership to George Samuel Rice; the Robert W. Hunt Prize for 1937 to William Floyd Holbrook and Thomas L. Joseph for their paper, "Relative Desulfurizing Powers of Blast Furnace Slags," presented at the February, 1936, meeting; and the J. E. Johnson, Jr., Award to John M. Hassler, "for meritorious work in advancing the quality and preparation of raw materials for the blast furnace." Nine men of the Class of 1887 Legion of Honor were welcomed by the assembled dinner guests.

The Institute of Metals Division annual dinner was held in the East Ball Room of the Commodore Hotel, Thursday evening, Feb. 18. The after-dinner talk by Samuel S. Wyer concerned itself with "Contributions to a Way Out of Today's Economic Muddle." The annual lecture of the Institute of Metals Division was presented by Prof. R. S. Hutton of the University of Cambridge. His subject was "Refractories." (See abstract herein.)

Dr. Paul D. Merica, vice-president of the International Nickel Co., Inc., the author of the 1937 Howe Memorial Lecture, spoke Thursday afternoon on "Progress in the Improvement of Cast Iron and the Use of Alloys."

Probably the most unusual of the special features during the five-day session was the "experience" meeting for students, held Monday afternoon under the sponsorship of the Committee on Student Relations. Six past presidents of the institute—Henry A. Buehler, Everett DeGolyer, Howard N. Eavenson, J. V. W. Reynders, George Otis Smith and Scott Turner—were seated at the head of the table and answered numerous questions advanced by assembled young men regarding their professions, their careers, or related matters. Many of the inquiries were asked from the floor, although a number had previously been submitted in writing.

Student members benefited considerably by attending a special lecture on the subject of physical metallography by Prof. C. S. Barrett of the Carnegie Institute of Technology. This talk, especially designed for students, dealt with the fundamentals and usefulness of stereographic projection methods in studying metal crystals.

On Friday numerous members and their families took advantage of the low-cost excursion arrangements to visit Bridgeport, Conn. Groups visited the Bassick Co., Bridgeport Brass Co., Bullard Co., General Electric Co., Raybestos-

E. Members Assemble

rk For 147th Meeting

ABSTRACTS Herein: "Refractories"; "Rate of Solidification of Rimming Ingots"; "Structure of Rimmed Steel Ingots"; "Factors Influencing Segregation and Solidification in Steel Ingots"; "Oxides in Basic Iron and Steel"; and "Freezing of Cast Iron".

Manhattan, Inc., Remington Arms Co., Sikorsky Aircraft Corp., Underwood Elliott Fisher Co., and Warner Brothers Co. A number of members also took advantage of the institute's regular annual Bermuda cruise, which sailed Feb. 19.

Refractories

The Institute of Metals annual lecture, delivered this year by Prof. R. S. Hutton (Goldsmiths' Professor of Metallurgy, University of Cambridge, England) and dealing with the subject of refractories, attracted a considerable amount of interest, both because of the scope of the data presented and, also, because the subject is one which has generally not received the attention it is worthy of. Professor Hutton pointed out the scientific study of the constitution diagrams of binary and ternary refractory oxides has been foremost in the United States, led by the work of the Geophysical Laboratory at Washington, all of which has laid a firm foundation for the whole subject. One has to remember, however, that to a much greater degree than with the constitution of metal alloys, the equilibrium conditions are so sluggishly arrived at that, in many practical applications, it is possible with appreciation to accept the definition of this field as covering the "chemistry of frustrated reactions." The applications of petrological and X-ray methods of examination are also proving most fruitful in advancing the industry's knowledge. On the manufacturing side, high-pressure forming, de-airing and electro-casting represent major advances in recent years, according to Mr. Hutton, as also does the utilization of new materials both from diligently sought out natural resources, or from artificially produced materials such as silicon carbide and fused alumina.

Above all the industry has been advanced by the recent cooperative effort for Standardization of Testing Methods, in which again America has taken a foremost position.

The insistent call for progress in refractories, said Mr. Hutton, seems to be due firstly to the urgent demand for more rapid metallurgical production, which entails higher temperatures and the concomitant more severe conditions of service; and secondly to the greater consideration which is being given to the thermal efficiencies of metallurgical processes. In both these directions, the industry is still only on the bottom rungs of the ladder of ascent.

As an example of the severe conditions which exist, consider the open-hearth production of steel, of which present-day temperature conditions have recently been investigated with the help of a new form of optical pyrometer. Temperature of the steel after melting down, 3000 to 3180 deg. F.; temperature of flame after melting down, 3240 to 3720 deg. F.; and temperature of the refractory roof after melting down, 3040 to 3130 deg. F.

The foregoing temperature measurements were made with a furnace built with a silica roof and the limitation of temperature is entirely due to the fact that any higher temperature would entail the very rapid melting of the roof and destruction of the whole furnace. Whereas it is readily possible by suitable regeneration, by the selection of combustible gases, and by utilizing recent knowledge of the importance of radiation from luminous and non-luminous gases to attain flame temperatures of 4890-5070 deg. F., i. e., about 1800 F. deg. higher than the maximum steel temperatures of present practice, operators are probably limited to an increase of 180-360 F. deg. even if the silica brick roofs are replaced with chrome-magnesia or any other of the better refractories at present available commercially. Although it is now known that radiation is far more important than convection for the transmission of heat units from the burning

gases to the metal, it is obvious that there is needed as high a "temperature head" as possible, and the fact that the refractories can only withstand such a low temperature shows how radically they fail to attain any reasonable standard for designing much of the present-day furnace equipment.

The ordinary open-hearth, said Professor Hutton, only has a thermal efficiency of about 20 per cent —40 per cent of the heat going up the stack and radiation and other losses accounting for the other 40 per cent. This crude economic wastefulness should surely offer a powerful incentive to striving for drastic improvements. The bugaboo of initial cost of construction has for far too long hindered rapid advance. Does it really pay to construct furnaces with a life of only a few hundred heats, with high upkeep costs, and with an overall efficiency of, say, 20 per cent? Does a silicon brick at 5c. really show an overall economy over a super brick at 50c. or even at a dollar? Fuel economy and above all long life and long runs between repairs of furnace structures may go far to offset such high costs and render the use and development of super refractories of real value to the progress of the metallurgical industries, according to Professor Hutton.

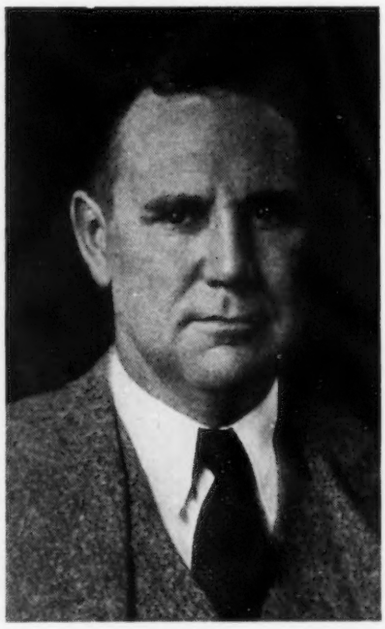
What then are the requirements? The most difficult of achievement is a high-temperature refractory suitable for use at temperatures well above 3630 deg. F. without melting, of sufficient hot strength, resistant to the wear and tear of the persistent streams of combustion gases and above all, capable of withstanding attacks by slags and fluxes and the clouds or jets of basic or acid discharges projected upon it from the molten metal. Fireclay has given place to silica and to magnesite and recently to chrome magnesite bricks, each in turn showing important but relatively small advantages, offset to a large degree by the ever-increasing rigor of the operation of the process and fundamentally hampered by all of them having temperature limits below what is really wanted.

The major hindrances to the achievement of the ideal refractory, according to Professor Hutton, lie in the instability of the components which are utilized and in the fact that the refractory in most cases depends upon the cementing together of refractory grains by ceramic bonds, frequently of quite different physical properties, both as regards thermal expansion and melting point, compared with those of the grains themselves.

If this be true, even to a partial extent, surely the road lies in the use of more stable and uniform components, fused or thoroughly shrunk refractory grain of as high a purity and uniformity as possible, and the development of autogenous sintering processes for their agglomeration.

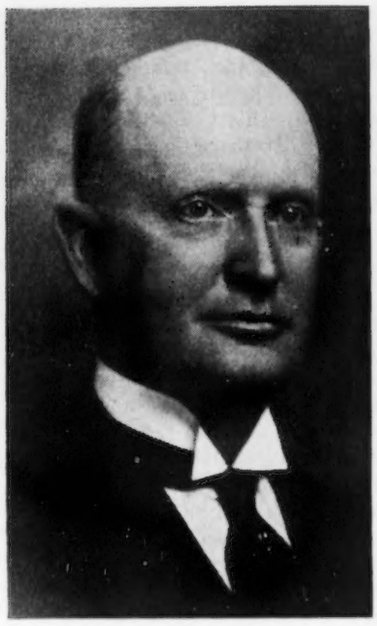
Now it happens that a good deal of laborious study has been devoted to this aspect of refractories, but so far almost exclusively from the point of view of laboratory vessels. These super-refractories for laboratory work possess two main characteristics: Firstly, they are fired at such high temperatures that the grains are sintered or fritted together and caused to recrystallize and produce a solid and strong structure, with little if any intermediate ceramic bond; secondly, they are made of highly purified and single-phase constituents or purposely chosen admixtures of constituents. Probably the prime cause of hesitation to develop large scale production in this direction lies in the fear that costs must necessarily be prohibitive. But all new ventures require vision. In this electrical age and with cheap oxygen available, costs would probably drop rapidly as production and technique advance.

Pure alumina is already available on a vast scale for the production of the metal, purified zirconia, magnesia and most of the other potential requirements are to be had at a cheap price, if the will to make them can be mustered up. On a small scale, recrystallized magnesia has been produced (by Mr. Hutton) with 1.17 kw-hr. per kg., and it is said that fused alumina can be produced for less than 3 kw-hr. per kg. and silicon carbide for 7 kw-hr. per kg.



ROLLAND CRATEN ALLEN

President of the A.I.M.E. for 1937. Born in 1881 at Richmond, Ind., Mr. Allen was educated at the University of Wisconsin, became Michigan State Geologist in 1909, vice-president of the Lake Superior Iron Ore Association in 1919 and president in 1930, director of the A.I.M.E. from 1930 to 1933, and elected director and vice-president in 1936.



ERSKINE RAMSAY

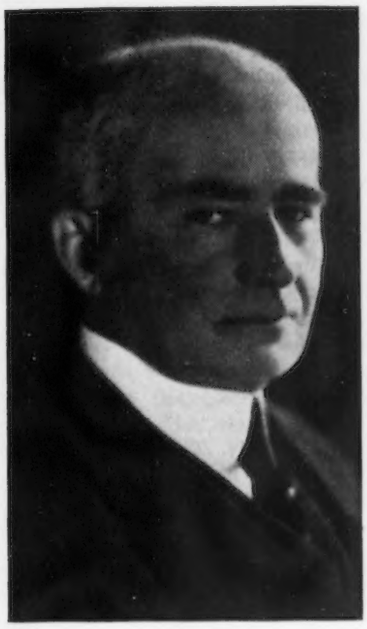
Chairman of the board and general consulting engineer of the Alabama By-Products Corp., Mr. Ramsay has been awarded the William Lawrence Saunders Medal for "his many inventions of all kinds of machinery and equipment used in bituminous coal mining and preparation; for effecting improvements in coke making that resulted in the establishment of the steel industry in Alabama; for administrative skill; and for personally aiding students and educational institutions."

The extreme limit of every refractory is its melting point, so consider the data which is available (see Fig. 1). Next to fusibility, the main concern is with the changes which occur when the grains of the refractories are heated up from normal to service temperatures. In most cases it appears undoubted that a high temperature pretreatment or even a fusion of the raw material affords advantages, not only in limiting subsequent shrinkage but in rendering the materials more resistant to attack by metals, oxides and fluxes.

So far as the sintering process is concerned, there is ample evidence that even with technically pure materials an effective bonding can be secured by raising the temperature of powders, the particles of which are in sufficient intimate contact. Tamman has found that fritting commences at the following temperatures: CaO, 2030 deg. F.; Al_2O_3, 2120 deg. F.; MgO, 2335 deg. F.; SiO_2, 1615 deg. F.; and Kaolin, 1895 deg. F. Many have been disappointed with such sintering processes for making refractory bricks and vessels because they have not utilized a sufficiently high firing temperature.

Table I shows some of the properties of densely sintered oxide refractories, which will serve to indicate what has already been accomplished on a relatively small scale.

In conclusion, Mr. Hutton stated that it is best, of course, not to pretend that the large scale production of such super refractories is in sight, but he expressed the hope that he be not considered too optimistic in urging that they are within reach if the subject is approached from the standpoint stressed in the paper. It would be advisable, at any rate, to take more active interest in higher temperatures of pretreatment and firing, in the sintering process, in the provision of pure raw materials, and in the further exploration of the constitution and properties of solid solutions of the refractory oxides, etc.



J. EDGAR PEW

Recipient of the first Anthony Lucas Medal, for "initiation and vigorous promotion of the program of standardization of oil-field equipment; constant championship of the use of engineering principles and talents in oil-field development; and for able work as an administrator." Educated in public schools at Mercer and Pittsburgh, Pa., Mr. Pew at 16 years of age was employed by Peoples' Natural Gas Co., Pittsburgh, ten years later journeyed to Toledo to work for the Sun Oil Co., in 1913 became vice-president and western manager of Carter Oil Co., and returned to the Sun company in 1918 to become vice-president and manager of production.

GEORGE SAMUEL RICE

Chief mining engineer of the United States Bureau of Mines, Mr. Rice has been voted the A.I.M.E. Certificate of Honorary Membership, for "his distinguished services in promoting safety in mining, the introduction of the use of rock dust in bituminous coal mines; and for many improvements in mining methods and apparatus which have greatly reduced the number of explosions and other hazards in both coal and metal mines."

Solidification of Rimming Ingots

One paper in the Iron and Steel Division dealt with the rate of solidification of rimming ingots and was prepared by John Chipman and C. R. FonDersmith, associate director of the research laboratories and superintendent of the open hearth department respectively of the American Rolling Mill Co.

In the manufacture of rimming steel—which constitutes the bulk of the world's production of mild steel—the factors which determine the quality of the product are very closely associated with the pouring and solidification of the steel in the ingot mold. The behavior of the metal in the mold is, on the one hand, the resultant of the complex processes through which the liquid metal has passed, and on the other, it is an indication of the probable behavior of the ingot during subsequent rolling and finishing operations. A detailed study of the mechanism of solidification of rimming ingots ought to yield information which will be useful in controlling the structure of the ingot and the quality of the ultimate product. The first step in such a study is to determine the rate at which the solid shell of the ingot forms from the liquid metal in the mold. A knowledge of the rate of solidification will make it possible to correlate observations of rimming action and gas evolution with studies of the structure, porosity and segregation within the ingot.

Thus, if the metal in the mold is observed to fall, say, one minute after pouring, the portion of the structure which is associated with this fall will be located in the part of the ingot which is solidifying at that particular moment. The knowledge that the ingot solidifies to a depth of ¾ in. in the first minute permits the location in the ingot of the structural features corresponding to the observed fall. Conversely, the blowhole condition associated with a rising or growing ingot will be found in that part of

the ingot which is solidifying at the time the phenomenon occurs.

The time required for the complete solidification of an ingot has long been a matter of speculation. It is of considerable practical importance in connection with charging and heating in the soaking pits. Too rapid handling of the ingot through heating and rolling processes has been thought to be associated with excessive pipe and other internal defects, so that a further object of the investigation was to attempt to estimate the time required for complete solidification, or the minimum practical time within which the subsequent operations can be performed with the minimum hazard.

The simplest and most direct approach to the problem is obtained by spilling the liquid contents of the ingot at a definite time after pouring, and measuring the thickness of the solidified shell. In order to keep down the cost of the investigation, it was decided to employ ingot butts for the preliminary measurements, and later to check these results by spilling a limited number of full ingots. The mold size selected was an 18 x 39-in. straight side mold, having a thickness of 8 in. at the bottom and normally poured to a height of 70 in. The ingot butt used was from 24 to 48 in. in height. Some of the experimental data are shown in Fig. 2. In general, mold temperatures were between 150 and 200 deg. F., and the metal temperature was from 70 to 100 deg. F. above the solidification temperature.

The data are adequately represented by the equation $D = -0.12 + 0.9\sqrt{t}$ where D is the thickness in inches and t is the time in minutes. The negative first term of the equation implies that there is a lapse of time of about 2 sec. between the moment of contact and the beginning of solidification. It is doubtful, according to the authors, whether the observations are sufficiently accurate to warrant the acceptance of this as a quantitative conclusion.

Several grades of steel were used in the investigation, including plain carbon grades, copper-bearing steel, deep-drawing grades and ingot iron. There were no consistent differences in solidification rates, nor does the rate for a full ingot poured near the first of the heat differ from that of a last-poured butt.

A full ingot was spilled at 16 min., and a section of this ingot is shown in Fig. 3. The irregularity at the left is simply a small amount of metal which failed to pour out when the mold was upset. The thickness of the shell is approximately the same at the top as at the bottom, the slight difference being fully accounted for by the difference in time of contact of metal and mold. The top of the ingot is free from blowholes, while the bottom contains the characteristic honeycomb structure always found in rimming steel ingots. The blowholes have evidently had no influence whatever upon the rate of solidification.

The authors found it very difficult to follow the course of solidification beyond 30 min. By extrapolating the curve, it is indicated that for an ingot of rectangular cross-section 18 in. thick, the time required for complete solidification is approximately 100 min. The effect of stripping before the expiration of this time would be to hasten the solidification, whereas charging into the pits would probably retard it.

TABLE I

Properties of Some Densely Sintered Oxide Refractories (Degussa Refractories)

Material	Melt. Pt. Deg. F.	Max. Service Temp. Deg. F.	Porosity	Hot Strength: Softening Commences, 2 kg. per sq. cm., Deg. F.	Sensitivity to Sudden Change of Temperature
Dense sintered Al_2O_3	3720	3540	negligible	3175	—
Dense sintered Spinel ($MgO.Al_2O_3$)	3875	3630	negligible	3175	+
Dense sintered BeO	4530	3990	negligible	3880	—
Dense sintered ZrO_2	4890	4530	marked	3630	+
Dense sintered $ZrSiO_4$	4530 (?)	3180	marked	2730	—
Dense sintered MgO (fused)	5070	3990	high	3630	+
Dense sintered MgO (calcined)	5070	4350	negligible	3630	+
Dense sintered ThO_2	5430	4890	negligible	over 3450	+

Structure of Rimmed Steel Ingots

Another investigation dealing with rimmed steel was concerned with the structure of ingots. The manuscript was prepared by T. S. Washburn and J. H. Nead, metallurgists for the Inland Steel Co. The authors pointed out that the grades of commercial steel produced in large quantities can be divided into two general types from the standpoint of ingot structure—killed and rimmed. Killed steel covers a wide variety with carbon contents throughout the range of the steel portion of the iron-carbon diagram, and is the kind usually used in the production of alloy steels. Rimmed steel is normally associated with carbon ranges under 0.30 per cent, and is not yet used to a large extent in alloy practice, except for copper-bearing steels.

In order to demonstrate the different types of ingot structures, and the effects of some of the variables in the furnace, and pouring practice on these structures, a group of experimental heats was selected by the authors for this study. The first two heats were killed high-carbon steel and semi-killed low-carbon steel, which were included for the purpose of comparing the structures of killed and rimmed ingots. The remaining heats were rimmed steel made according to production methods, which show some of the normal variations in ingot structure that are encountered in practice.

The ingot cross sections were all obtained by the dynamite method. In a 24x43-in. low-carbon rimmed ingot, a row of holes 1⅜ in. in diameter and 6 in. apart was drilled on the center line of the 43-in. side. The depth of the holes was approximately 13 in., or slightly over halfway through the ingot. Each hole was usually charged with 1½ sticks of 60 per cent gelatin dynamite. The electric detonators were connected in series. After the sticks and caps were in place the holes were tamped with damp clay. Particular care must be taken when blasting, to cover the ingot with a ladle or heavy steel box, to prevent injury from flying fragments.

Killed Ingot (High-Carbon Steel)

(1) Furnace practice: The bath was deoxidized with 10 per cent

ferrosilicon; 80 per cent ferromanganese and 50 per cent ferrosilicon were added to the ladle to meet the specification.

(2) Pouring practice: Molds were 27x27 in. Not hot-topped. Warm and tar-dipped. Poured 84 in. high. No pyrometer reading. There was a 4000-lb. ladle skull.

(3) Ladle analysis: C, 0.95 per cent; Mn, 0.36; P, 0.020; S, 0.026; and Si, 0.280.

(4) Ingot structure: The ingot was split in half lengthwise. There was a well defined pipe and no primary or secondary blowholes.

Semikilled Ingot (Low-Carbon Steel)

(1) Furnace practice: The bath was deoxidized with spiegel 10 min. before tapping. Ferromanganese, ferrotitanium and aluminum were added to the ladle.

(2) Pouring practice: Molds were 24x43 in. Slightly hot. Tar-dipped. Poured 62 in. high. The deoxidation was completed in the molds with an addition of 5 lb. of aluminum at the top of the ingot. Temperature, 2883 deg. F. Clean ladle.

(3) Ladle analysis: C, 0.08 per cent; Mn, 0.46; P, 0.015; and S, 0.027.

(4) Ingot structure. The ingot was split in half along the 43-in. side. The pipe was 28 in. long and 15¾ in. wide at the top. There were no secondary blowholes. The primary blowholes were very small and short, and penetrated the surface at scattered points. The primary blowholes disappeared at a distance of 34 in. from the butt.

Normal Rimmed Ingot

(1) Furnace practice: An addition of spiegel was made to the bath 26 min. before tapping. The bath and slag analyses before the spiegel was added were as follows: C, 0.065 per cent; Mn, 0.12; and FeO, 16.2. Ferromanganese and aluminum were added to the ladle.

(2) Pouring practice: Molds were 24x43 in. Warm. Tar-dipped. Poured 66 in. high. Eight ounces of aluminum was fed to each ingot during pouring. A good rimming action developed. The metal dropped 1½ in. before starting to rim, rimmed in 3½ in. and dropped 2 in., forming a dished top. Temperature, 2894 deg. F.

(3) Ladle analysis: C, 0.09 per cent; Mn, 0.37; P, 0.009; and S, 0.026.

(4) Ingot structure: The ingot

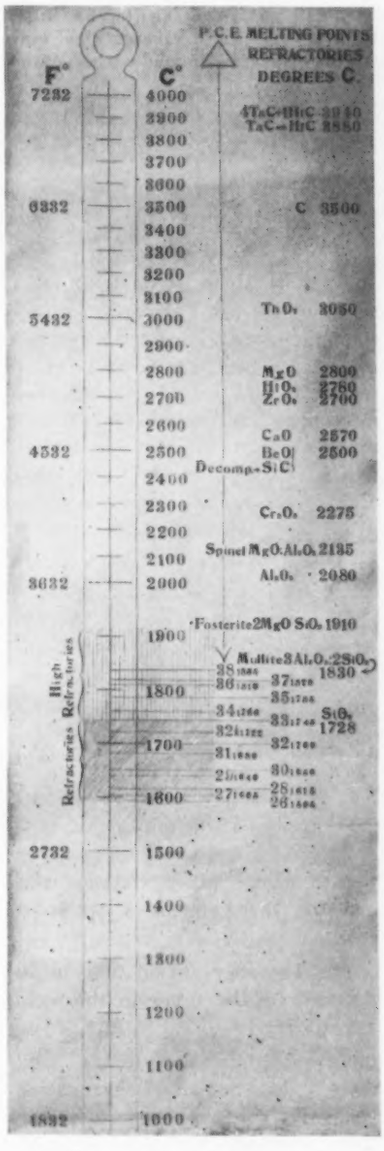


FIG. 1—What may be expected in the way of super-refractories. This scale gives the melting points of some possibilities. A number have been made on a laboratory scale, and it is possible that commercial production may be attempted in the not too distant future.

was split in half along the 43-in. side. The skin was ¼ to ½ in. thick near the bottom of the ingot. The primary blowholes were of medium size and tended to form a double row in the lower part of the ingot. The row nearest the surface disappeared at a distance of 30 in. from the butt and the inner row disappeared at a distance of 40 in. from the butt. The secondary-blowhole zone consisted of medium sized blowholes. This zone was approximately 6 in. from the surface.

Thin-Skinned Rimmed Ingots

(1) Furnace practice: An addition of spiegel was made to the bath 23 min. before tapping. The bath analysis of a test killed with an excess of aluminum and the slag analysis before the spiegel was added were as follows: Bath: C, 0.08 per cent; Mn, 0.15; P, 0.011; S, 0.023; and Al_2O_3, 0.098. Slag: FeO, 18.1; and Fe_2O_3, 8.2. The analyses of similar tests taken 4 min. before the heat was tapped were as follows: Bath: C, 0.09 per cent; Mn, 0.19; P, 0.012; S, 0.020; and Al_2O_3, 0.106. Slag: FeO, 18.6; and Fe_2O_3, 7.9. Ferromanganese and 42 lb. of aluminum were added to the ladle.

(2) Pouring practice: Molds were 24x43 in. Warm and tar-dipped. Poured 67 in. high. Three ounces of aluminum was placed on the stool and 5 oz. was added at the top. The metal was slightly wild during the pouring of the upper quarter. There was a 1-in. drop and no growth, with a moderate rimming action, forming a flat top. Temperature, 2916 deg. F. Scrappy ladle.

(3) Ladle and slab analyses: Aluminum-killed ladle test: C, 0.09 per cent; Mn, 0.42; P, 0.010; S, 0.020; Al_2O_3, 0.105; and Al, 0.572.

Rimmed ladle test: SiO_2, 0.0041 per cent; Al_2O_3, 0.0068; Mn, 0.0090; FeO, 0.0317; and (FeMn)S plus oxides, 0.107.

(4) Ingot structure: The ingot was split in half along the 43-in. side. The skin was ⅛ to ¼ in. thick near the bottom of the ingot. The primary blowholes were large, particularly those nearest the skin. The primary-blowhole zone disappeared about 40 in. from the butt of the ingot, but the blowholes were still fairly large at a distance of 32 in. from the butt. The secondary-blowhole zone consisted of medium sized blowholes. This zone was approximately 6 in. from the surface.

Primary and Secondary Blowhole Zones

In the course of the experiments on splitting ingots the authors

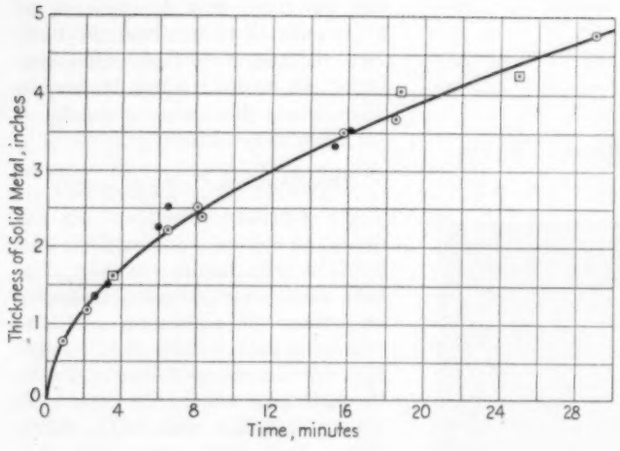


FIG. 2—Rate of solidification of 18 x 39-in. rimming ingots. Open circles, ingot iron butts; squares, steel butts; solid circles, steel ingots.

were occasionally able to break off pieces that could be prepared for etching. Two of these pieces are shown in Fig. 4. The one view is an etched section of an ingot 22x24x75 in., of low-carbon rimmed steel, which shows parts of the zones of primary and secondary blowholes, about 25 in. from the butt. The skin is from ¼ to 5/16 in. thick and the secondary-blowhole zone is 4⅜ in. from the surface. This is a good example of a medium thick skin and large primary and secondary blowholes. The view on the right is an etched section of an ingot 24x43x73 in., of low - carbon rimmed steel, which shows parts of the zones of primary and secondary blowholes about 20 in. from the butt. The skin is about ½ in. thick and the secondary-blowhole zone is 5 in. from the surface. This is a good example of a thick skin and very small primary and secondary blowholes.

Segregation and Solidification

Details on some of the data influencing segregation and solidification in steel ingots were presented in a paper by Leon H. Nelson, open-hearth metallurgist for the Republic Steel Corp. Mr. Nelson pointed out that the several factors which affect the segregation and solidification of killed hot-topped steel ingots are: (1) pouring temperature, (2) volume in the hot top, (3) taper in the ingot, (4) pouring rate by varying the nozzle size, (5) segregation of several elements, (6) moving ingots before completely solidified.

In most of the author's discussion, segregation was measured in terms of carbon variation only. All the data given were results on S.A.E. 1040 analysis of fully killed steel direct-poured in hot-topped molds giving 20-in. square ingots. Thus the variables of analysis and ingot size and contour were eliminated. Segregation results were all on the rolled-bloom size, not on the ingot itself. They were results from plant-control work and not results of special research on ingot segregation.

The major conclusions arrived at were as follows:

(1) Normal pouring temperatures are best to avoid excessive segregation.

(2) The volume of metal in the hot top must be correct to keep segregation at a minimum. Volumes that are too small give segregation and pipe; volumes that are too large mean a waste of steel.

(3) The segregation may be influenced by the taper in the mold.

(4) The rate of pouring the ingot (within the limits mentioned) does not affect segregation. Excessively fast or excessively slow pouring, however, probably have an influence.

(5) It is important that killed ingots should not be moved before they are completely solidified.

In conclusion, the writer suggested that in determining ways of preventing excessive positive segregation at the top of ingot the experimenter should not neglect to test the segregation and soundness lower down in the ingot. It was the experience of Mr. Nelson that some procedures that reduce positive segregation at the top of the ingots may also increase negative segregation and unsoundness along the central axis near the middle of the ingot.

Oxides of Iron and Steel

An elaborate study of the oxides in basic pig iron and basic open-hearth steel was presented by T. L. Joseph, professor of metallurgy, University of Minnesota. In his introduction the author stated that the extent to which hot metal from the blast furnace affects open-hearth practice and the quality of steel produced has been discussed widely. Open-hearth operators have attributed difficulties experienced in making satisfactory steel to characteristics of the pig iron not disclosed by ordinary analysis. The commonest criticism of the iron has been that it is "physically cold" or "dirty." Often when the blast furnaces are working irregularly the quality of the iron is questioned. A cold hearth, slipping and hanging, the use in the past of unsintered flue

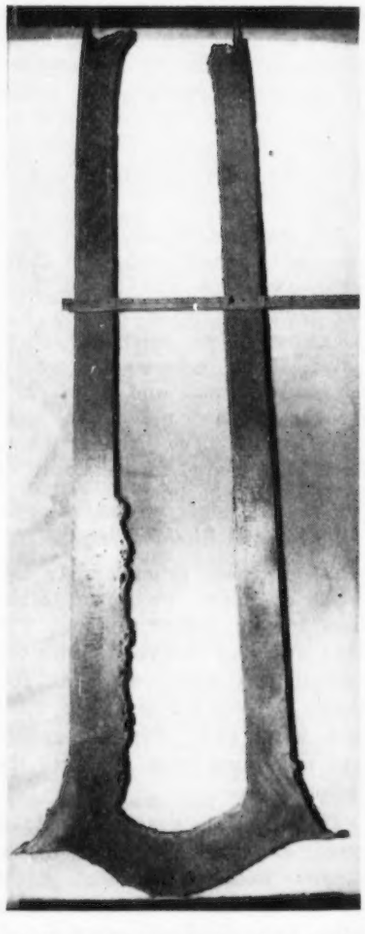


FIG. 3—Sectioned skin of an ingot of low-carbon steel spilled 16 min. after starting to pour. Note that the bottom contains the characteristic honeycomb structure always found in rimming steel ingots.

dust, and the use of ores difficult to smelt have been associated with the production of iron of poor quality.

The difficulty of the situation is that the trade has no proved yardstick for quality aside from ordinary analysis. Uniformity in analysis is recognized as being important, but the difficulty of changing the open-hearth practice when the iron analysis varies widely may not always be fully appreciated. Although the problem of correlating the characteristics of steel with those of pig iron is admittedly obscure, the effort of producers of quality steel to investigate all factors that may have a bearing on the final product is justified.

The author's report contained data on the oxides in several hundred casts of basic iron produced in a furnace during the course of normal operation on Lake ores. Incidental to the study of the oxides in the iron, it was desirable to follow closely the temperature of the iron. The effect of temperature of the iron upon the silicon and sulphur present is discussed. A general relation between the basicity of the slag and the sulphur in the metal was developed. The amount and composition of oxides in the hot metal and in the steel bath during various intervals between melt-down and tap were discussed. Heats of rimmed steel, killed steel, and semi-killed steel were investigated. The hot metal on individual heats was either all taken from a mixer or consisted partly of direct metal and partly of metal from the mixer. Samples of the iron for oxide determinations were taken from transfer ladles just before charging into the open hearth. All samples from the steel bath were taken in pairs. One was allowed to rim in the sample mold while the other was killed with aluminum.

The author summarized the experimental data in the following manner:

The temperature of several hundred casts of metal produced in a 700-ton furnace operating on Lake ores was measured with noble-metal thermocouples to observe the effect of temperature upon the oxides in the iron. A definite relation between silicon and sulphur was established, but no relation was found between the oxides in the iron and the temperature of the iron. Close control of the silicon and sulphur in the iron requires that the average temperature of the iron be held within narrow limits. In general, a variation of 20 deg. F. in the average temperature of the iron in the runner will result in a 10-point (0.10 per cent) variation in silicon and a 1-point (0.001 per cent) variation in sulphur. Variations in sulphur, silicon and temperature are due largely to variations in the pattern of gas distribution in the furnace shaft. Uniform gas distribution requires careful control of the size of materials and distribution of stock.

The total oxides in the iron ranged from 0.012 to 0.313 per cent. As the total oxides increased the percentage of FeO in the oxide residue increased. The oxide residues from 194 casts averaged 22 per cent SiO_2, 14 per cent MnO and 64 per cent FeO. A small amount of Al_2O_3 was found in occasional casts.

Microscopic examinations at 50 diameters disclosed the presence of large inclusions in some samples. Small, irregular inclusions observed at 1000 diameters were more characteristic of the samples studied. No definite relation was found between the number or size of inclusions and the amount of oxides as determined by electrolytic extraction. Some tendency was shown for the inclusions to be associated with the graphite. The oxide content of the iron had no apparent effect on the form of the graphite.

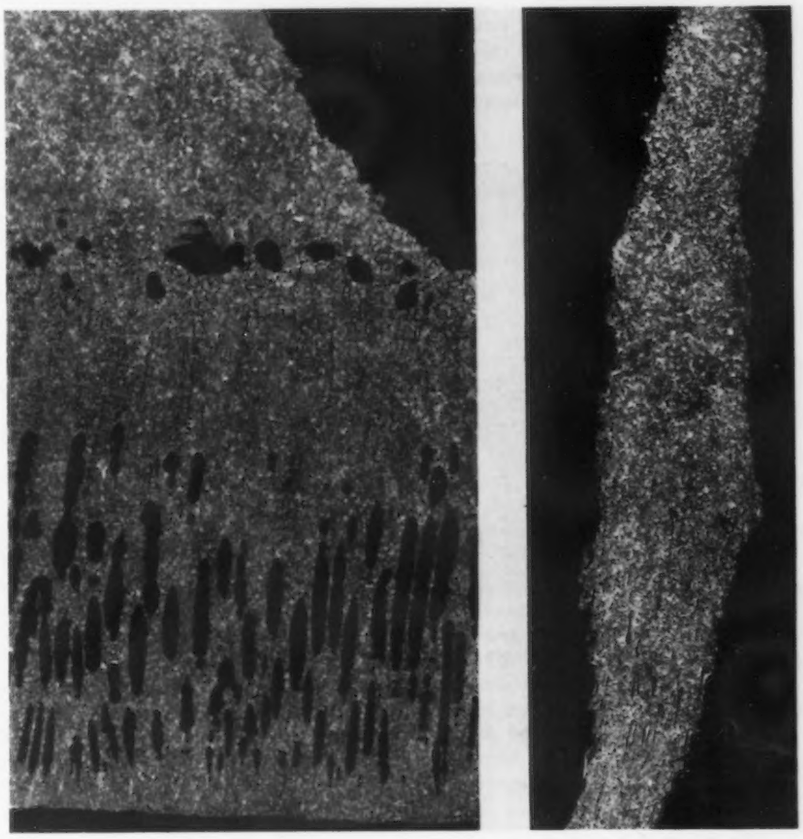


FIG. 4—(Left) Low-carbon rimmed ingot with large blowholes. On the right, a low-carbon rimmed ingot with small blowholes.

All together, eight samples of pig iron were examined for inclusions, at 50 and 1000 diameters. Small, gray, angular or hexagonal inclusions visible at 1000 diameters characterize all eight samples. These inclusions are too small for identification, according to Mr. Joseph. The large inclusion shown in Fig. 5 (left) illustrates the difficulty of polishing samples without dislodging inclusions of the more friable and less siliceous type. This sample contained a large number of such inclusions,

which were lost during polishing. The fragment retained was too small for identification, but the extreme friability indicates high FeO content.

The large inclusion shown in Fig. 5 (right) contains particles of metallic iron, which indicates that it had been molten. Iron thus encased may account for the unusually high iron content of occasional samples, usually extremely high in total oxides. Metallic iron in an inclusion would not be eliminated during electrolytic extraction or during the copper sulphate treatment to eliminate metallic iron from the extraction residue.

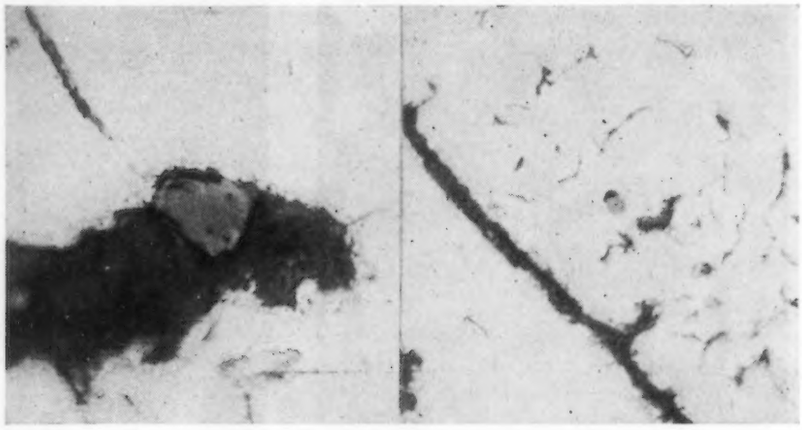


FIG. 5—Inclusions in basic pig iron. Both views taken at 1000 diameters. The sample on the right is unetched.

The cause for variations of the oxides in the iron was not determined. Groups of casts low in total oxides (0.019 per cent) contained practically the same amount of silicon and sulphur as groups of casts high in total oxides (0.1 to 3.0 per cent). Casts extremely high in oxides showed the greatest variation in silicon from the previous cast. In the low and intermediate range of oxides the variation in silicon was about constant. No consistent relation was found between furnace practice and the oxides in the iron.

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A relation established between the carbon and the total oxygen in 150 aluminum-killed samples shows that the FeO in the bath before deoxidation is primarily a function of the carbon in the bath. Variations in the ferrous oxide in the iron have no effect upon the iron oxide in the open-hearth bath. Any tendency for finely dispersed SiO_2 or silicates in the iron to persist through the open-hearth process can be detected from SiO_2 determinations on the iron and the open-hearth bath. The amount of SiO_2 in the bath of 23 heats of steel before deoxidation showed no relation to the amount of SiO_2 in the molten iron charge. SiO_2 as such or in combination in the form of silicates is largely eliminated early in the heat, when large amounts of SiO_2 and MnO are formed adjacent to inclusions in the iron.

In rimming steel the FeO introduced into the bath to eliminate carbon is largely eliminated by the C-FeO reaction and the rimming action in the ingot mold. In killed or semi-killed steel this FeO is reduced to metallic iron by deoxidizers. The cleanliness of the steel depends upon the amount of FeO present and the degree to which the products of deoxidation are eliminated. The introduction of FeO into the steel bath and its subsequent elimination are basic features of an oxidizing process.

The temperature of molten-iron charge for individual heats varies, depending upon the manner in which the iron is handled after it leaves the blast furnace, according to the author. Metal moved to the open hearth in submarine ladles and transfer ladles is substantially higher in temperature than metal from a hot metal mixer. Variations in temperature of the iron at the open hearth, due to differences in methods of handling the iron after it leaves the blast furnace, are greater than the variations in the temperature of individual casts in uniform blast-furnace practice.

The analyses of metal reported to the open-hearth melter were approximately the same as the analyses obtained from samples taken from transfer ladles. Differences between the reported and actual analysis of the iron depend upon the uniformity of the iron and the method of sampling at the blast furnace. There was no evidence of stratification in the mixer. Data from this investigation do not, however, preclude the possibility of stratification when the iron varies widely in analysis.

Tough Steels Went By Tender Names

TULIP, Daisy, Swan, Drake and many other once highly respected trade names for various makes of iron and steel products which appear in the archives of the American Iron and Steel Institute, are now only memories of a more romantic era. Increasing appreciation of engineering data is chiefly responsible for the disappearance of most of the old trade names.

As recently as 35 years ago the trade names of tin plate were more closely allied with botany and zoology than with the steel business. Among the tin plate brands chosen from floriculture were Crocus, Hyacinth, Jonquil, Cornflower, Sweetbrier, Holly Wood, Golden Rod, Moonflower and Star Flower. Zoology contributed the well-known tin plate brand names of Duck, Drake, and Swan. Under the patriotic names of U. S. Eagle and U. S. Grant were sold the terne plate products of one manufacturer.

Trade names still appear in the advertising of steel mill products, but most of them are descriptive of the properties, uses, or composition of the steels, or indicate the name of the company.

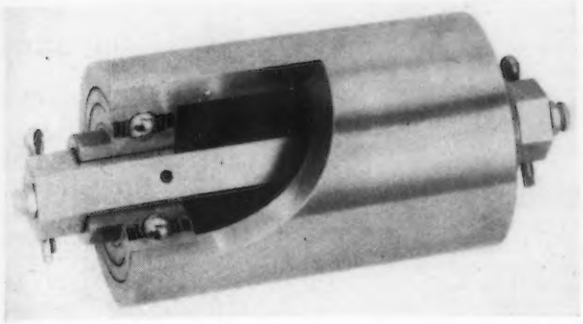


FIG. 1

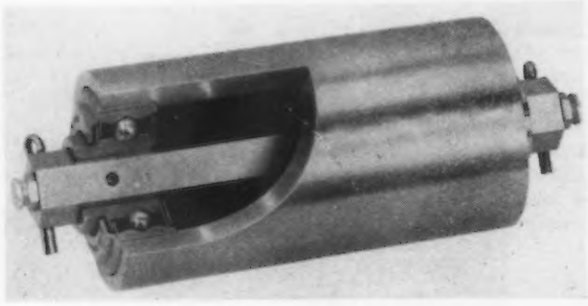


FIG. 2

New Conveyor Rollers For Heavy Duty

TWO new ball bearing conveyor rollers designed especially for heavy duty service have just been placed on the market. Both designs incorporate self-contained double seals which protect the ball bearings and ball raceways from foreign matter, such as dust, dirt and grit.

In Fig. 1 is shown a 4¼ in. diam. roller equipped with the first of these new bearings, cut away to reveal the construction details. The bearing, mounted on a 1¼ in. hexagonal axle, is contained within a pressed steel jacket, protected by outside and inside labyrinth seals. 13 hardened steel balls run in hardened steel inner and outer races. Industrial grease fittings afford a means for periodical lubrication. Load ratings vary with the three available diameters as follows: Used as gravity roller conveyer, the continuous load ratings per roller are, 4 in. diam. 3000 lbs.; 4¼ in. diam. 4000 lbs.; 4½ in. diam. 4500 lbs. When used in level lines the ratings are, 4 in. diam. 3500 lbs.; 4¼ in. diam. 4500 lbs.; 4½ in. diam. 5000 lbs.

Fig. 2 shows the second design, which includes features similar to those described for the first design, but is available for rollers of 5 in. diam. in lengths to suit, within practicable limits. This design may be applied for both power driven and gravity type conveyors. Each roller has a continuous load rating of 8000 lb. per roller.

The use of hexagon axles effectually prevents the inner ball raceway from rotating on the axle, which is held stationary in the conveyor frame. Seamless steel tubing is used for the rollers in both cases, the wall thickness varying with the roller diameters as follows: 4 in. diam. 5/16 in. wall; 4¼ in. diam. 7/16 in. wall; 4½ in. diam. 9/16 in. wall; 5 in. diam. 0.71 in. wall.

These bearings and rollers are products of Mathews Conveyer Co., Ellwood City, Pa. Since November of last year it is understood that considerable footage of both designs have been furnished to the heavy industries field.

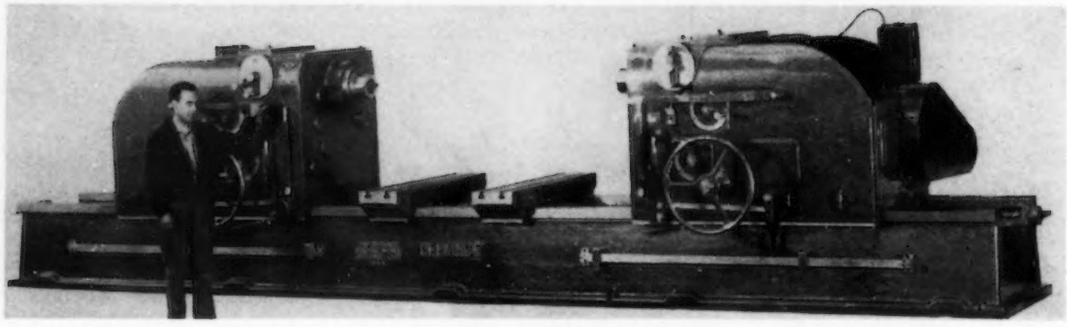
Electric Furnace for Laboratory Use

THE Thermograd laboratory electric furnace illustrated has been designed by the Duncan Mackenzie's Sons Co., Trenton, N. J., for working temperatures up to 2500 deg. F. Four sizes, with heating chambers ranging from 4½ in. wide by 5 in. high by 6 in. deep to 10 in. wide by 9 in. high by 18 in. deep, are available.

Furnace shells are of asbestos lumber, reinforced with steel angles. The corner angles and the asbestos extend down to form the legs, which raise the hearth to the proper working level. The hearth is composed of a suitable monolithic refractory, well insulated to prevent excessive thermal losses. The design of the door—an outstanding feature — eliminates the necessity for chain hoists, counterweights, foot-levers, or guide channels. The insulated handle and unique hinge construction make it possible to readily swing the door in or out of position with one hand.

Heating elements, of Mackenzie design, are said to provide perfect metal to metal contact. They are suitable for use in either reducing or oxidizing atmospheres. The two elements in the smallest furnace are mounted horizontally through the side walls from side to side of the heating chamber, and are located near the ceiling. They are supported in the furnace by water-cooled terminals, thus assuring maximum electrical contact.

Transformers are furnished for voltage control, and a standard ammeter is supplied. Where very small increment control of temperature is required, use of a control pyrometer is recommended.



Large Casings Bored on Heavy Two-Way Machine

FOR boring, facing and counterboring pump and other large casings from opposite ends, the Defiance Machine Works, Defiance, Ohio, has developed the extra heavy horizontal two-way boring machine here illustrated.

The spindle heads mounted at the ends of the machine bed with work platens between them have independently controlled drives, speeds and feeds. The bed is 25 ft. long, has ways 6 in. wide with a maximum spread of 34 in. One way is used as a guide for the head slides which are 64 in. long.

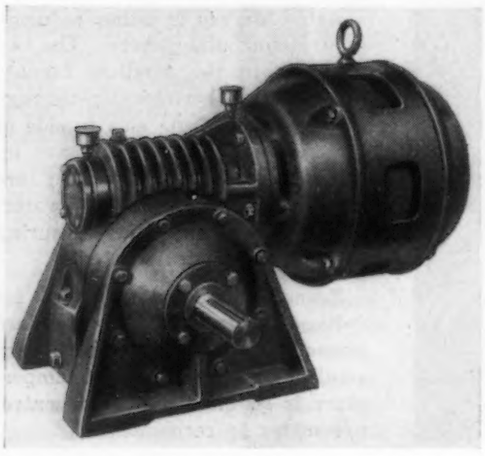
Each spindle head is driven by V-belts from a motor mounted on the rear side and 12 spindle speeds from 8 to 225 r.p.m. are obtainable by sliding gears mounted on splined shafts. Four feed changes, ranging from 0.0078 to 0.0625 in., are available by shifting gears on splined shafts. Speed and feed changes are entirely independent. Power rapid traverse and hand feed in either direction are also provided. Feeds and rapid traverse are operated by directional control levers.

The spindles are 5 in. in diameter and have taper socket nose with hole through for draw bolt. They are mounted on Timken bearings. All intermediate shafts are anti-friction bearing. All spindles, gears, and shafts are of heat treated alloy steel, the spindle drive gears being of the herringbone type. Each spindle head is provided with a pump for automatic lubrication of bearings and gears. The spindle head slides each have a movement up to 6 ft. on the bed, with maximum distance of 12 ft. between noses of spindles. Centers of spindles are 26 in. above top surface of work platens and 55 in. from the floor.

Work platens, which are 12 in. wide, 5 in. high and 48 in. long, may be positioned independently on the bed for mounting of suitable work-holding fixtures. The machine weighs 29,475 lb., net, and occupies floor space of 6 ft. x 25 ft. x 8 in.

Speed Reducers In 1/50 to 3/4-Hp. Sizes

A COMPLETE line of fractional-horsepower motorized speed reducers designated as "IXL fractional horsepower Powered Gears" has been introduced by the Foote Bros. Gear & Machine Corp., 5301 South Western Boulevard, Chicago. These units range in size from 1/50 to ¾ hp., and in ratios from 2 to 1 up to 8000 to 1. The various types include single and double reduction worm gear, single reduction helical gear and combination worm gear and planetary gears at higher ratios. One of the double reduction units, worm gear and planetary, is shown in the accompanying illustration.



Housings, covers and bearing end caps are of close-grained cast iron, treated to prevent flaking. All units have large radiating surface for heat dissipation. Shafts are of high carbon steel and all bearings are of anti-friction type except in the VX type unit. Worm gearing is used in all but the TH type, which has helical gears, and the worm gear planetary combination type which is a combination of worm and spur gears. All worms are made of alloy steel, hardened, and the threads are ground and polished. Worm gears are of a special cast gear bronze, and all spur gears are of steel, with cut teeth. Lubrication is automatic, and an oil gage is provided to indicate the amount of lubricant in the gear case.

A NEW cement for polishing wheels, intended to replace glue and offered as a simplified method of preparation, requiring no heat, has been announced by the Midwest Abrasive Co., 2189 Beaufait Avenue, Detroit. By the use of a special thinner, any density of cement required can be made up so that wheels of varying densities can be uniformly surfaced — a feature emphasized as permitting exact regulation for wheels of canvas, leather, felt, and other materials.

Improved Universal Vertical Miller-Shaper

A HIGH-SPEED spindle mounted in anti-friction bearings and 10 right-hand spindle speeds with a high of about 2100 r.p.m. are features of an improved Colby universal vertical milling and shaping machine announced by the Cochrane-Bly Co., Rochester, N. Y.

The spindle is equipped with a sleeve to hold split collets from ⅛ to ⅝ in., thus eliminating the need for a "high speed" attachment. It can be furnished with or without power down feed with four changes applicable to any spindle speed. Feed has automatic stop and a micrometer screw for gaging depth.

The Pratt & Whitney system of end gages, micrometers and dial gages reading to 0.0001 in. may be used for accurate setting of the table for boring holes in jigs and fixtures, dies, gages, and molds, as well as for milling and shaping operations.

A radius tool attachment that fits the shaper ram in place of the clapper block will shape punches from the rough without undercutting. A punch located on the compound circular table can be machined on all sides, and from any center within a 5-in. circle, developing true radii, tangent and angular cuts with high accuracy. These table settings can be duplicated when machining the die opening with the regular tool holder. On many dies and punches, the accuracy obtained is said to result, in a large saving of transfer time and set-up and in filing and fitting.

The milling and shaping heads adjust at any angle right to left, or left to right from vertical to horizontal, and 45 deg. front and back from center for drilling, milling, boring, shaping and slotting operations. The table can be arranged to receive a 10-in. universal dividing head as shown. Spiral gears, milling cutters, and a wide variety of other work on centers formerly limited to horizontal spindle type machines can now be machined on this universal vertical machine.

Welding Torch Has Improved Features

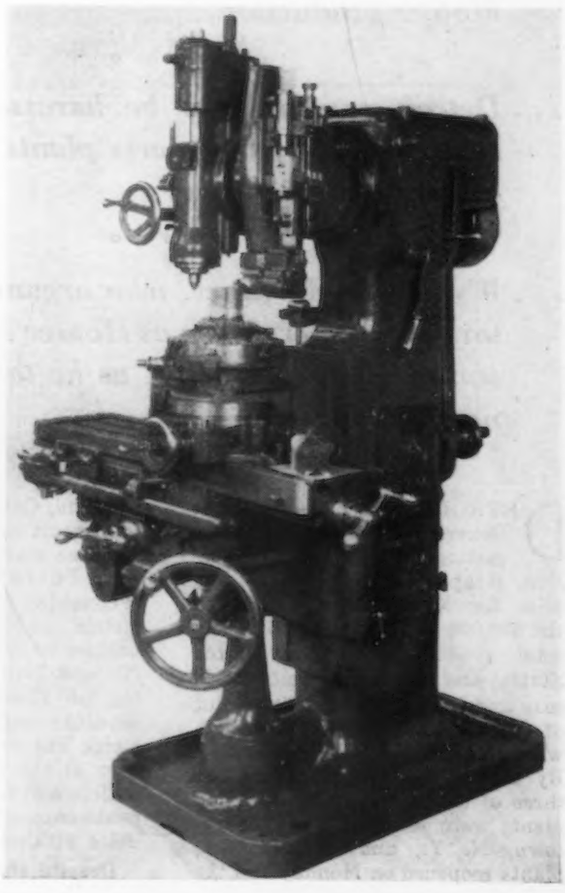
AN improved automatic welding torch that weighs only 13 oz. and is designed with a special gas-tight swivel which enables the operator to weld in any direction without changing the angle of the torch has been placed on the market by the Weldit Acetylene Co., 641 Bagley Avenue, Detroit.

The torch automatically shuts off to a pilot light when not in use, and automatically comes back to full flame when the operator is again ready to weld. It has no mechanism inside the handle; and its small fuel control valves are placed at the front end of the handle, where they can be adjusted conveniently. Another feature of

the new torch, the model W, is a replaceable tip nut at the end of the extension; this eliminates the necessity of replacing the entire extension should threads in the tip nut become worn.

o o o

A NEW high-speed spindle and speeds up to 2100 r.p.m. are features of this Colby Universal Miller-shaper. The system of end gages, micrometers and dial gages shown in the close-up view assures accurate setting of the table, which can also be arranged to receive a 10-in. universal dividing head.



THIS WEEK ON THE ASSEMBLY LINE

. . . March production should approach 500,000 units as General Motors plants dig into backlog of unfilled orders.

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. . . January sales of passenger cars should top 1936 figure by 20 per cent despite loss of General Motors production.

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. . . Detroit continues to be harassed by sit-down strikes in body and parts plants, with wage increases the chief goal.

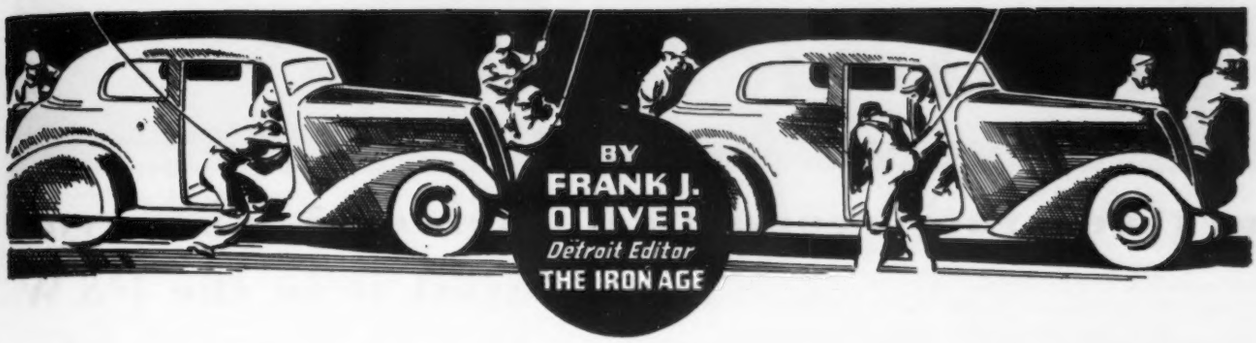
o o o

. . . Wyndham Mortimer, who organized White Motor Co. workers, seen as Homer Martin's successor as UAW president, as he takes the lead in negotiations.

DETROIT, Feb. 22.—Now that General Motors plants are getting back into full production, it appears that total assemblies for March should approach the 500,000 mark. In March, 1936, total production in the United States and Canada was 442,545 cars and trucks, and the high point of the year was reached in April, when 527,728 units were assembled. By the end of last week all but three of the 11 Chevrolet assembly plants were working. The Tarrytown, N. Y., and Atlanta, Ga., plants reopened on Monday and the Oakland, Cal., plant was scheduled to resume operations on Feb. 25. Cadillac started a week ago Monday, followed by Pontiac on Wednesday and Buick and Oldsmobile on Thursday. Cadillac's backlog of retail orders is over 10,000 and Pontiac has a retail backlog of 25,000 cars. Its March schedule calls for 30,000 units. Buick has over 60,000 unfilled orders at the factory and at dealer outlets and is expected to equal its peak capacity of close to 30,000 units attained last December.

Despite the strike and the closing-down of its assembly lines, Buick recorded the highest January sales on record. Furthermore, Buick delivered at retail slightly more cars in the first 10 days of February than it did in the same period a year ago. Those companies not affected by strikes showed even more important gains in February. Studebaker sales for the first 10 days were up 77 per cent. Packard expects to ship 13,000 cars this month, compared with 4517 in February last year. Its January shipments of heavy cars were almost double those of a year ago. According to R. L. Polk & Co., December registrations of Packard cars were 7529, against 4160 in 1935, and of this group roughly half were the new sixes. Between Sept. 1 and Feb. 1 Packard shipments totaled 52,186 cars, almost double the corresponding five months in 1935-36, when shipments were 27,906. The company expects to ship approximately 15,000 cars during each of the months of March and April, far in excess of any previous production record.

Graham-Paige reports a 35 per cent increase in retail domestic deliveries from Oct. 1 to Feb. 1, the total reaching 4564. Since Nov. 30, Willy's-Overland has manufactured 15,159 cars, greater than the entire production of the 1936 model. Production for the first 15 days of February totaled 4561 units, an increase of 51 per cent over the output during the first 15 days of January. (Amos Northup, the designer of the present Willys "comeback" car, died last week as a result of a fall near his home in Pleasant Ridge, Mich.) Shipments of 1937 Hudsons and Terraplanes



were running nearly 50 per cent ahead of those of last year until a couple of weeks ago, when weekly production declined from 3600 units, at which point it had held for eight weeks, to approximately 2400 units for the past two weeks. December registrations ran about 22 per cent ahead of those of December, 1935.

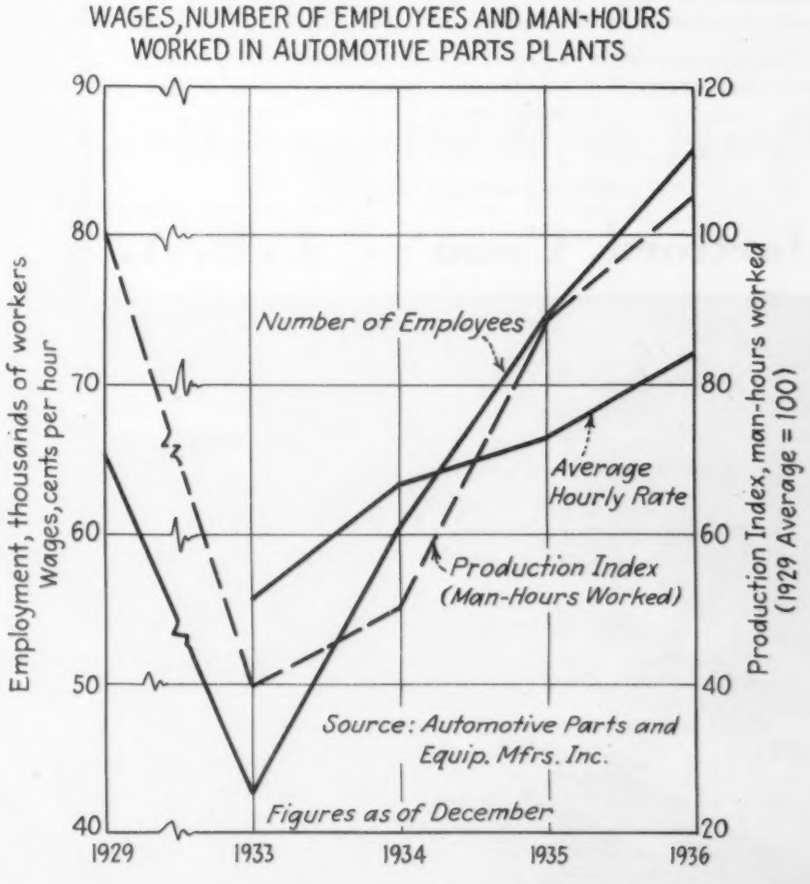
Large Steel Releases

An example of what temporary suspension of car manufacture can do to suppliers is indicated by some of the releases issued last week by Pontiac on parts and materials sufficient to build 50,000 cars. More than 75,000 tons of material was represented by releases on old orders, including 1500 tons of pig iron, 2000 tons of steel scrap, 15 carloads of coke, 12,500 tons of strip, sheet and bar steel, 5620 tons of forgings, 500 carloads of frames, 1250 tons of bumpers and nearly 1000 tons of chassis springs. These figures do not include about 1000 lb. of steel and other materials used in making each Fisher body. Parts supplied from other General Motors units included 750 tons of steering gears and 100 carloads of axle housings.

With General Motors back in the picture, assemblies for the week ended Feb. 20 advanced to 88,740 passenger cars and trucks in the United States and Canada, compared to 74,145 in the previous week and 66,547 in the ice-bound days of February, 1936, according to Ward's Automotive Reports. General Motors' assemblies advanced from 1400 to 12,185 units. Chrysler moved up from 26,650 to 29,350 as its Evansville plant got into production after the flood. The plant was not under water, but had its power cut off during the days of high water. Ford also staged an advance of an even 1000 to 29,825, the highest yet attained on 1937 production. As General Motors gets into full swing, total production should advance rapidly to well over 100,000 jobs a week. A further rise is expected about mid-March, when spring sales drives are undertaken.

Labor Troubles Continue

While all the above news sounds extremely optimistic, Detroit is a long way from being out of the woods so far as labor difficulties are concerned. During the past week, no less than 15 sit-down



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Successful surface grinding requires the right table speeds for each job. The hydraulic drive produces any table speed from zero up to 100 feet a minute. It can be kept at exactly the right speed for roughing or finishing any job. Higher speeds mean harder wheels, and lower wheel costs. More than that, the increased table speeds make practical many jobs that never have been ground successfully before, particularly on very thin work.

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strikes occurred in the city, many of them in parts and body plants supplying the automotive industry. In practically every instance, the basis of dispute was an increase in wages. Briggs Mfg. Co. had announced on Feb. 15 that wage increases would be put through on a merit basis. Tuesday night a group of almost 500 in the assembly division sat down in protest after they saw their "pink slips." Other groups followed until about 1000 men were involved. Doors leading to the departments affected were barricaded and the union men went about systematically signing up the imprisoned workers as members of the UAW. In its settlement with the group, Briggs agreed to adopt the same wage scale as the Chrysler Corp. for every corresponding job classification. Six months ago, the disparity was substantial.

Meanwhile Richard T. Frankensteen, UAW organizational director, served nctice on the Chrysler Corp. Sunday that demand would be made for recognition of his union as the bargaining agency for all Chrysler Corp. divisions. Frankensteen claims that all UAW locals have voted for presentation of the demand and for any action that may be necessary to enforce the request. The same day it was learned that the Detroit plant of Thompson Products, Inc., had signed a contract with the UAW in which the group was recognized as the sole bargaining agent for Thompson employees for six months. Abolition of group bonus and granting of straight seniority ratings was part of the agreement. Negotiations began this Wednesday with demands for a 75c. minimum wage and time and a half for over a 40-hr. week.

The L. A. Young Spring & Wire Corp. had a strike on its hands Thursday, but resumed operations on Friday and an agreement was made to negotiate with the UAW beginning Monday afternoon. The Ferro Stamping Co. also had a sit-down strike on Thursday when 600 men and women remained in possession of the plant. A 10 per cent increase had been granted the workers in December and the company offered a 5 per cent increase to satisfy the present protest, the workers demanding a straight 10c. an hr. increase. The demand, incidentally, makes it practically impossible for the company to operate on a paying basis. Budd Wheel Co. also was involved in a quickly settled sit-down strike on Friday, although the company had announced wage increases earlier in the week.

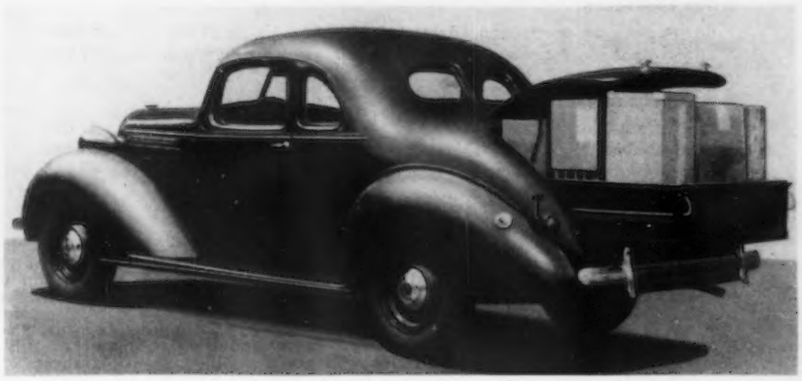
The general opinion in the city of those who are authorities on industrial relations seems to be that Detroit can expect this sort of thing for some time to come, largely as a result of the way the General Motors strike injunction was handled and the manner in which the writs served upon the persons of the strikers were ignored. Judge Gadola meanwhile is demanding an apology from those who stood in contempt of his court. The settlement of the Kelvinator sit-down strike "out of court" gave workers another example of how State laws could be successfully defied.

G-M Negotiations Jeopardized

In the meantime, the negotiations between General Motors officials and the UAW were jeopardized last week by a short sit-down strike at the St. Louis plant of Fisher Body, where discrimination against union members was charged. This particular trouble was quickly cleared up, however, because it was largely the result of a misunderstanding as to just what the company was trying to do in re-opening one division ahead of another. During the week discussions centered around the question of seniority on a straight time basis and the means to be set up for handling questions of discrimination. At the present writing, it looks as if the negotiations would drag on for some weeks, particularly when the conferees reach the vital point of discussing the 30-hr. week. It is generally felt that the corporation will put up a strong fight in compromising on its present 40-hr. week with time and a half for over-time.

It is significant that during these negotiations and also during the critical days just prior to the signing of the truce between General Motors and the UAW and CIO, Homer Martin was traveling around the country making speeches. In fact, the only UAW official whose name is attached to that famous document is Wyndham Mortimer, vice-president, the other union signatures being those of Lewis and Lee Pressman, CIO counsel. Recalling that an annual meeting of the UAW will probably take place in early April, it would not be amiss to surmise that Mr. Mortimer is headed for the presidency of the UAW. He gained his seat as first vice-president as a result of his activity at the White Motor Co. in Cleveland, which he succeeded in organizing on practically a 100 per cent basis, an organization effected, incidentally, through the White works council, an employee representation group that had been functioning for over 10 years prior to its capture by the UAW. Mortimer is a self-educated man who in appearance resembles any "solid" business leader. During his days on the White works council he exhibited the desire, although not always the capacity, for leadership and is said to be in some respects a Lewis type. Those who knew him there say he has socialistic leanings, and it is understood from other sources that he has a record of activity in the Communist Party. Should he assume the leadership of the UAW, we shall expect to see in office a more aggressive type than Homer Martin, who was ready to compromise early in the hectic days of the General Motors deadlock and who was practically told to take a walk by John L. Lewis. The story going around Detroit now is that Lewis gave in because he was flat on his back with influenza and lost a good deal of his fight. Who should hold out longest was largely a matter of physical stamina.

TERRAPLANE'S business coupe can be changed into a light pick-up truck through the use of a sliding steel box mounted on rubber-covered rollers. The box measures 49½ by 38 in. and is 11⅝ in. deep, with a loading height of 32 in. under the rear deck door.



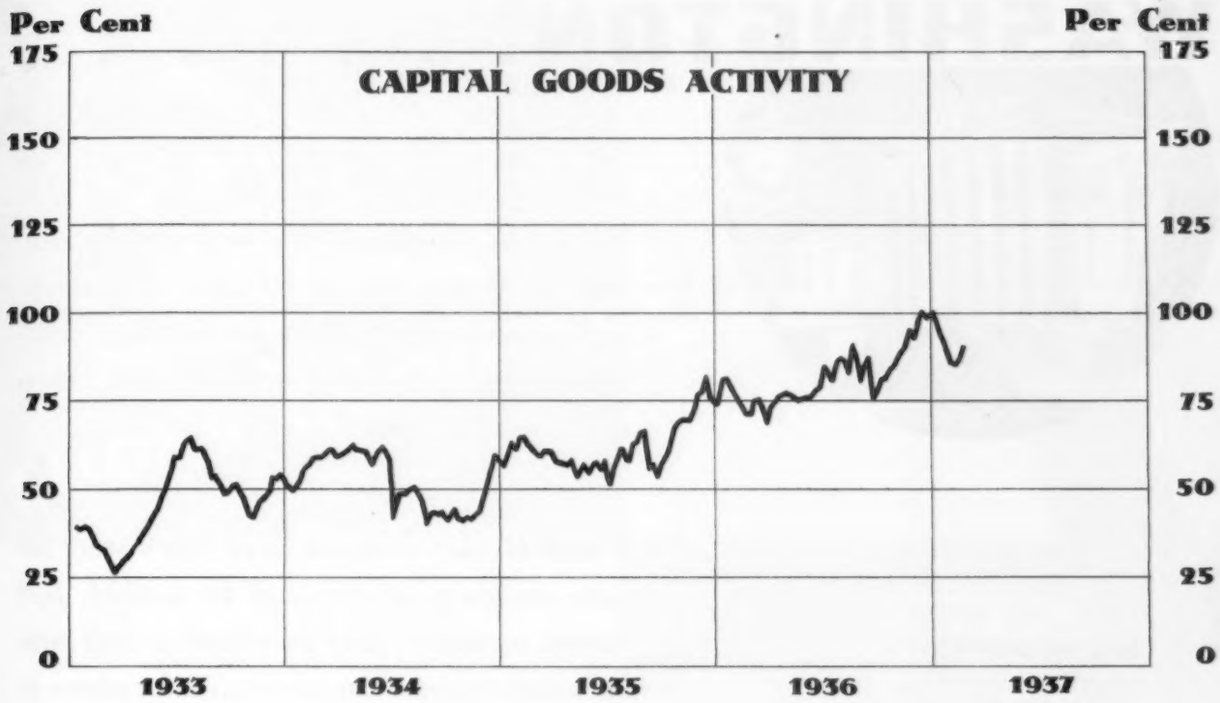
Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	January, 1937	December, 1936	January, 1936	Year, 1935	Year, 1936
Raw Materials:					
Lake ore consumption (gross tons)[a]	4,694,312	4,551,379	2,951,568	30,857,862	44,639,318
Coke production (net tons)[b]	.....	4,608,655	3,450,342	35,141,261	46,317,087
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	3,211,500	3,115,037	2,025,885	21,007,802	30,618,797
Pig iron output—daily (gross tons)[c]	103,597	100,485	65,351	57,556	83,658
Castings:					
Malleable castings—production (net tons)[d]	.....	61,674	48,198	466,395	571,696
Malleable castings—orders (net tons)[d]	.....	67,035	43,852	452,611	576,334
Steel castings—production (net tons)[d]	.....	83,615	44,298	398,988	805,691
Steel castings—orders (net tons)[d]	.....	159,430	59,019	400,157	909,080
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	4,736,697	4,431,645	3,045,946	33,417,985	46,919,362
Steel ingot production—weekly (gross tons)[e]	1,069,232	1,002,535	687,572	640,928	897,463
Steel ingot production—per cent of capacity[e]	81.42	77.66	51.40	48.54	68.52
Finished Steel:					
Trackwork shipments (net tons)[e]	7,246	5,579	3,366	42,229	68,813
Steel rail orders (gross tons)[e]	25,700	125,290	208,541	533,120	1,053,230
Sheet steel sales (net tons)[f]	.....	336,758	174,805	2,473,489	2,720,330
Sheet steel production (net tons)[f]	.....	230,581	223,000	2,424,990	2,598,140
Fabricated shape orders (net tons)[g]	.....	166,542	120,364	1,068,603	1,609,016
Fabricated shape shipments (net tons)[g]	.....	121,775	79,995	1,095,216	1,548,205
Fabricated plate orders (net tons)[d]	.....	51,017	38,709	258,315	484,038
Reinforcing bar awards (net tons)[e]	10,220	18,550	62,210	318,340	334,790
U. S. Steel Corp. shipments (tons)[h]	1,149,918	1,067,365	721,414	7,371,299	10,825,132
Ohio River steel shipments (net tons)[i]	96,400	111,450	65,760	926,174	1,169,321
Fabricated Products:					
Automobile production, U. S. and Canada[k]	399,426	519,132	377,306	4,119,811	4,616,857
Construction contracts, 37 Eastern States[l]	$242,844,000	$199,695,700	$214,792,800	$1,844,544,900	$2,675,296,000
Steel barrel shipments (number)[d]	.....	895,481	542,597	6,872,452	8,600,493
Steel furniture shipments (dollars)[d]	.....	$2,112,972	$1,586,446	$15,523,579	$19,245,935
Steel boiler orders (sq. ft.)[d]	.....	1,872,139	623,364	6,245,158	11,511,557
Locomotive orders (number)[m]	46	112	14	87	533
Freight car orders (number)[m]	10,881	19,035	1,050	18,699	67,544
Machine tool index[n]	200.3	257.7	110.8	†99.9	†201.7
Foundry equipment index[o]	190.9	283.3	127.0	†119.5	†224.9
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	52,584	50,489	470,015	666,838
Imports of pig iron (gross tons)[p]	.....	10,423	15,036	130,937	165,909
Imports of all rolled steel (gross tons)[p]	.....	19,968	22,958	216,628	270,594
Total iron and steel exports (gross tons)[p]	.....	244,156	241,564	3,063,605	3,162,694
Exports of all rolled steel (gross tons)[p]	.....	126,173	79,100	897,883	1,167,244
Exports of finished steel (gross tons)[p]	.....	117,979	74,254	767,590	1,040,815
Exports of scrap (gross tons)[p]	.....	103,026	153,906	2,044,506	1,881,983
British Production:					
British pig iron production (gross tons)[r]	650,700	671,400	595,500	6,426,400	7,685,600
British steel ingot production (gross tons)[r]	998,900	1,019,200	912,500	9,842,400	11,706,300
Non-Ferrous Metals:					
Lead production (net tons)[s]	43,636	47,085	36,296	421,764	463,187
Lead shipments (net tons)[s]	45,718	51,646	34,590	433,456	512,975
Zinc production (net tons)[t]	40,025	47,050	41,917	431,499	524,271
Zinc shipments (net tons)[t]	50,638	59,821	46,468	455,746	563,273
Deliveries of tin (gross tons)[v]	7,615	6,930	6,535	59,110	74,005

† Three months' average.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of Census; [l] F. W. Dodge Corp.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.



THE IRON AGE Weekly Index Numbers of Capital Goods Activity
(1925-27 Average = 100)

Last week	90.3	Same week 1933	32.5
Preceding week	86.7*	Same week 1932	40.1
Same week last month	89.8	Same week 1931	69.9
Same week 1936	70.9	Same week 1930	96.4
Same week 1935	61.6	Same week 1929	122.4
Same week 1934	58.7	* Revised	

PRODUCTION and distribution in the durable goods field increased considerably last week according to THE IRON AGE's seasonally adjusted index of this activity. The index rose to 90.3 per cent of the 1925-27 average after having scored a slighter advance in the previous week to 86.7 per cent. Three weeks ago the index had dropped to a low point for the year of 85.3, having worked down to that level from its opening high for 1937 of 100.2.

While only about one-third of the ground lost since then has been recovered up to the present, the index's present showing compares favorably with its standing in the corresponding 1936 week of but 70.9 per cent of the base period average.

The event last week which contributed most to the index's improved position was the spurt in motor car production following settlement of the General Motors strike. Output gained by some 14,600 units assembled. Steel mill activity, too, registered a pick-up, and there was an appreciable increase in forest products loadings. Construction work remained about unchanged, but the industrial trend at Pittsburgh dropped down a point.

World industrial activity outside of Russia expanded during December to 110.7 per cent of the average for 1928, according to the monthly index prepared by *The Annalist*. For November the figure was 107.3. The increase reflected especially the sharp increase in activity in the United States, although elsewhere the tendency was also upward.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

WASHINGTON. . . . . .

. . . President remains non-committal on suggestion by Bureau of Business Research, acting under Falk Foundation, that commission be appointed to study and "control" steel pricing.

o o o

. . . Walsh-Healey tempest over Navy steel requirements probably will be settled, but threat to make steel in obsolete and dismantled Charleston government plant is regarded as silly.

o o o

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

o o o

WASHINGTON, Feb. 23.—President Roosevelt has interested himself in the exhaustive report of the Bureau of Business Research of the University of Pittsburgh on "The Economics of the Iron and Steel Industry." That he has no fixed purpose in mind as to what action, if any, he may propose after studying the report is evident. This was made clear by reason of the fact that when he was asked at a press conference last Friday if he had had his attention directed to the report he replied that he had not heard of it. Immediately, however, he turned to Secretary Stephen Early and asked that he be supplied with a copy of the report. The President was asked specifically if his attention had been called to the suggestion in the report that a Federal impartial and non-political fact-finding commission be established to make a study of the iron and steel industry and make recommendations to Congress concerning "an effective public policy toward the price problem in the iron and steel industry."

Inasmuch as he had not heard of the report it is obvious that the President has arrived at no conclusion as to whether he will set up the proposed commission. As pointed out in the report, the commission would be staffed with men qualified by economic, statistical, accounting and engineering training and versed in the complexities of the industry. It would be vested with authority to prescribe and collect the type of information required and hold hearings and summon representatives of all affected groups. The groups would include not only producers but consumers, representatives of labor, etc. As shown in the summary of the report published in THE IRON AGE of Feb. 18, it would be by far the most voluminous and comprehensive study of the industry ever made, dealing with every phase of its activity, with emphasis on its pricing policy and labor relations. The proposed commission itself would be out of the ordinary since it would be made up of impartial experts, if the suggestion made were followed, and therefore would be an independent body unlike any purely government organization that has ever studied the industry. Manifestly the proposed study would carry far-reaching implications with a definite indication of governmental effort to change existing and to establish new industrial policies, first for the steel industry and apparently with like moves as to other basic industries of the country. It would of course call for legislation, some of it distinctly of a nature which has been invalidated by the Supreme Court, the outstanding example being the National Industrial Recovery act. But the President now is endeavoring to bring about new legislation covering wages, hours and labor relations, and to this end is seeking reorganization of the Federal Judiciary, including a plan to appoint six new members to the Supreme Court.

What Sort of Control?

The report itself says that "Price control in steel cannot be uprooted by legislation, and it cannot be appraised intelligently without a knowledge of comparative costs." Nevertheless it suggests some form of control, basing its premise on the inference that steel does not now carry a fair price, a suggestion which is sharply challenged by the

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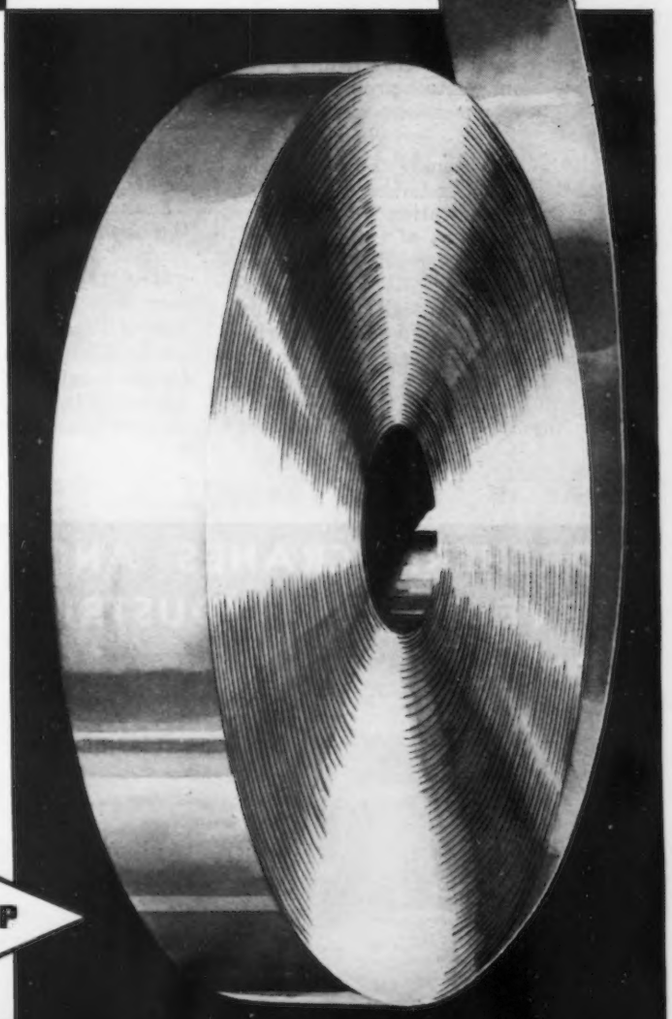

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industry. The report contends that "A fair price for steel and the elimination of preventable social waste can be assured under private ownership only if some form of control can be made effective." The report does not make clear what the form of control should be.

The report repudiates the Federal Trade Commission attitude on steel pricing. The Commission has repeatedly recommended abolition of the basing point system and the substitution of the f.o.b. mill system of pricing. Rejecting this commission position, the report said that "the traditional attitude of the government, as has been expressed in the anti-trust laws and by the Federal Trade Commission, is inconsistent with the economics of the steel industry and therefore is in the long run doomed to futility." The report supports the idea of a basing point system, saying that some form of such a system "with the right to absorb transportation to meet competition is required for most tonnage-steel products." The NRA recommended basing point areas.

While the report thus slaps the FTC plan, it endorses the idea of vertical unionization in the industry for purposes of collective bargaining. Hence, while it makes no mention of John L. Lewis's Committee for Industrial Organization the report endorsed the CIO principle. Having been made public at a time when Lewis has declared he will intensify his drive to unionize the steel industry the report created unusual interest in this direction. The CIO in any event is held to have been given encouragement by the report. Certainly the CIO has received sympathetic consideration at the hands of the National Labor Relations Board, headed by Dr. J. Warren Madden, a member of the University of Pittsburgh faculty, but at no point in the report is it indicated that Dr. Madden had any part in the steel study.

Meanwhile deep interest has been shown in the possible attitude of President Roosevelt with respect to the report.

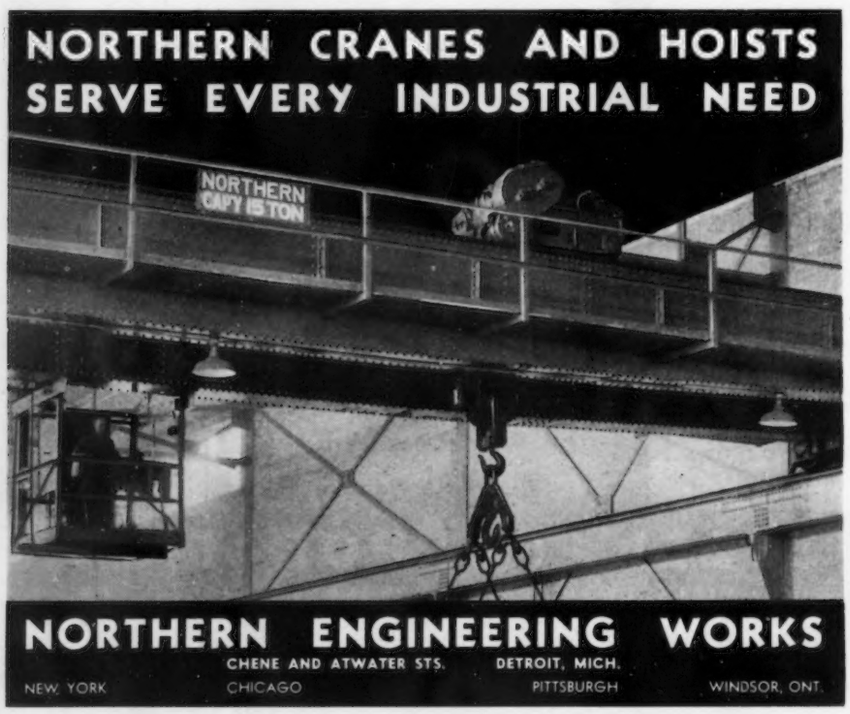
Opposed to FTC Viewpoint

It would seem evident that the report is not to the liking of the Federal Trade Commission since it criticizes as unsound the commission effort to have the basing point system done away with and its own pet policy of an f.o.b. mill system adopted. The FTC plan was again brought forth last week when Senator Wheeler of Montana, chairman of the Committee on Interstate Commerce, reintroduced his bill to eliminate the basing point system and to compel f.o.b. mill quotation. The measure was referred back to the Senator's committee. It is doubted that the bill will get anywhere, though its proponents say they will push it in the hope of having it passed. It has no sponsor in the House at present. At the former session of Congress it was sponsored by Representative Utterback of Iowa. Mr. Utterback was defeated for reelection. Senator Wheeler said there would be no further hearing on the bill. It was the object of extensive hearings before the Senate Interstate Commerce Committee at the previous session. Many steel executives appeared before the committee in opposition to the measure.

Steel is also still in the limelight in Washington because of the situation that has developed under the Walsh-Healey government contracts act with the President taking a hand in the matter. Refusal of steel makers to submit bids on steel, needed by the navy in connection with its building program, has caused a lot of criticism to be leveled at the steel industry from some government sources and also from organized labor groups. The latter oppose exemptions under the act. Nevertheless, there are government officials who criticize the Department of Labor for the situation. Senator Walsh of Massachusetts, one of the authors of the act, has leveled fire at the Department of Labor, saying the fault lies with administration of the act by the department, and not with the steel industry. The Senator has threatened to ask Congress to amend the act unless the Department of Labor grants hours exemptions to the steel industry and to other industries supplying national defense needs.

However, Assistant Secretary of the Navy Edison, after conferring with President Roosevelt last week over the navy steel problem, said he believed no legislative action would be necessary. At the same time he planned discussion of the situation with Assistant Secretary of Labor McGrady. He also said he planned to inspect the shipbuilding yards to speed up construction of naval vessels and suggested standardization of building plans as a preliminary recommendation. Mr. Edison said he informed the President that the navy yards, according to present indications, will not be forced to close down until the latter part of March at the earliest because of steel shortage, even if arrangements for supplies were not made in the meantime.

The President nevertheless said that the situation had reached a point where something might have to be done about getting steel for the navy within the next few weeks. He said that there was no question about that. In reply to questions, the President previously had referred to the defunct government armor plate plant at Charlestown, W. Va., and the ridiculous inference was drawn in some published reports that this plant was being held as a "club" over the steel industry to compel bids under



the Walsh-Healey Act. The Charlestown plant of course is not at all equipped to roll steel for navy requirements but consists only of forging machinery, together with open-hearth capacity and actually never produced steel except experimentally. Even part of the machinery has been sold, as stated by the President. The President said the plant has an excellent location and that what machinery remains is for the making of armor plate. The plant, he said, would have to be "retooled" if it were reopened. Actually it would have to be entirely reequipped if it were to be used to meet naval needs. Such a costly, impractical and prolonged program definitely is not to be undertaken. Rather confidence is expressed that some sensible arrangement will be made whereby the navy will get all the steel it wants. Both the President and navy officials have denied that it is planned to "retool" the plant and use it to make steel to meet shipbuilding requirements. But the Administration has said it has refused offers to purchase the plant.

The President did not indicate his position as to exemptions under the act but he did say that he favored the labor standards established by the Walsh-Healey act and added that he would like to see them applied to industry all over the United States. Actually the average weekly hours in the steel industry range but slightly above the 40-hr. standard set up by the Walsh-Healey act.

"One Way" Bargaining

The fact that it would be physically impossible for the steel industry to operate on a specific 40-hr. week basis of course does not worry organized labor forces which are raging against any exemptions. They just easily say the steel industry can adjust itself to the terms of the Walsh-Healey act. This is said by some in organized labor who really know that no continuous industry can arbitrarily limit its hours of work to an exactitude. But it is good labor politics. So they proceed and say something can be done that can't be done. They even go further. They attack the steel industry as being "unpatriotic" and are propagandizing reports that steel makers are in "collusion" in refusal to bid on navy contracts for the purpose of breaking down the Walsh-Healey act. John L. Lewis' brother, A. B. Lewis, harped on this as a CIO representative at the conference last week and organized labor interests held with Assistant Secretary of Labor McGrady. Lewis demanded an investigation by the Department of Justice or the Department of Labor or both. Now along comes President Green of the American Federation of Labor. Parrot-like, Green imitates the tactics of his bitter foe, the CIO, and has said he will ask the Department of Justice to determine if there have been any irregularities in bidding on government steel contracts. The Executive Council of the A. F. of L., Green emoted, will oppose any attempt to modify or set aside the labor standards of the Walsh-Healey act. Senator Walsh, who pushed the legislation through the Senate in the dying moments of the last Congress, at the strong insistence of Green, has said, however, if the Department of Labor does not loosen up on exemptions he will require that the act be modified or its operations removed as to the purchase of national defense requirements. The Navy must have steel, he has said in effect, and can't stand on rigid and illogical terms of the act which prevent delay of steel deliveries. The Senator, like

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the Administration, is anxious to stimulate naval construction and is anxious to avoid obstacles that would hold it up. Just what might be done if agitators started labor disturbances in the steel industry is also something to think about seriously. The present temporary hold up of steel under the Walsh-Healey act is not a marker in the way of delaying national defense building when compared with what would be done in this direction by labor trouble. Sitting down, which has been so widely popularized, even to the extent of a demonstration being staged at the White House, does not build ships. Might it be that under the circumstance it would not be "patriotic"?

Edward G. Budd Mfg. Co., Philadelphia, has announced a general wage increase amounting to 7 per cent, the second to be placed in effect by the company within the past 60 days. The previous wage increase was made effective Dec. 15, and the present one Feb. 16.

The increase will affect about 5450 employes. On an annual basis, the combined increases amount to over $1,000,000.

Approximately 1800 workers are returning to work at the Racine, Wis., plant of the J. I. Case Co. following settlement of a strike which began last October.

. . PERSONALS . .

ALFRED E. GIBSON has been elected president of the Wellman Engineering Co., Cleveland, succeeding GEORGE W. BURWELL, who has become chairman of the board. JOHN A. PENTON, who has been chairman of the board and treasurer, has retired. C. C. CLAYTON has been elected treasurer in addition to his duties as secretary. Mr. Gibson has been executive vice-president of the company since 1935. He was employed by the company during summer vacations while in college and, upon his graduation from Ohio State University in 1909, he joined the operating department, later becoming superintendent of the Cleveland plant and then general superintendent in charge of both its Cleveland and Akron plants. In 1926 he left the company to become associated with the Fulton Foundry & Machine Co., Cleveland, as vice-president and later was elected president. In 1928 he returned to the Wellman company as its works manager. In 1930 he was elected vice-president and in 1937 vice-president and assistant general manager in charge of engineering and shop production, serving in those capacities until he became executive vice-president. Mr. Gibson is president of the American Welding Society, a member of the American Society of Mechanical Engineers, Association of Iron and Steel Engineers, American Society for Metals, and the International Acetylene Association and has become an authority on the development and application of low-alloy steels in welded construction. Under his direction the Wellman company has widely extended the use of welding processes and made extensive applications of the new low-alloy high-strength steels in the manufacture of its product.

ALFRED E. GIBSON

J. HARRY WARRINER

J. HARRY WARRINER has been appointed works manager, Wellman Engineering Co., Cleveland, with which he has had 32 years of continuous service. He was first employed by the company in 1905 as a boy in the tool room and afterwards served an apprenticeship as machinist and later became the shop estimator. In 1919 he was placed in charge of production and

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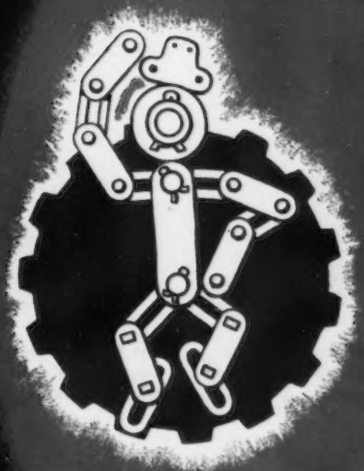
Equally effective are the Jeffrey chains for sheet transfer tables . . . pallet conveyors . . . slab transfer and crop conveyors . . . and other equipment in your steel plant.

You will find it to your advantage to consult with Jeffrey engineers on your chain and conveying problems.



Jeffrey

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estimating at the company's Akron plant. In 1925 he returned to Cleveland having been promoted to the sales department and assigned to special sales work.

❖ ❖ ❖

NATHANIEL B. RANDOLPH has been promoted from assistant general manager of sales of the Granite City Steel Co. to vice-president in charge of sales, to succeed

N. B. RANDOLPH

LAURENCE F. MILLER, who has resigned. A native of Milwood, Va., Mr. Randolph started with the company in 1919, after serving in the Army during the World War. In 1921, he was made district manager of sales for the St. Louis district and in 1933 was advanced to assistant general manager of sales. Before enlisting in the Army in 1917, he had been a manufacturer's agent for iron and steel products in the St. Louis district.

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BRUCE B. WALLACE has joined the staff of the Los Angeles office of the Foxboro Co., Foxboro, Mass., maker of industrial precision instruments. He will work out of Los Angeles as a sales engineer.

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H. SYDNEY SNODGRASS has been appointed manager of the motor coach division of Gar Wood Industries, Inc., Detroit, to fill the vacancy created by the resignation of STANLEY E. KNAUSS. Mr. Knauss has been manager of that division ever since the company began production of Gar Wood streamlined motor coaches. Mr. Snodgrass, long associated with Mr. Knauss as the division's chief engineer and assistant manager, enters his new position with a complete knowledge and understanding of the manufacturing and administrative policies and plans of the division. Present plans of Mr. Knauss include an extended stay in Florida. Later it is his intention to establish his own business, not yet named.

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WILLIAM C. CONNELLY, who was president of the former Connelly Boiler Co., Cleveland, has been elected director of the Ohio Seamless Tube Co., Shelby, Ohio.

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H. B. LOXTERMAN has been elected vice-president of the Blaw-Knox Co., Blawknox, Pa., and ALBERT L. CUFF has been made secretary. The following officers have been elected to subsidiary companies: W. H. EISENBEIS has been made vice-president of the Union Steel Casting Co., JOHN BAKER has been made sales manager of the Union Steel Casting Co., and P. M. FLEMING has been made vice-president and a director of the Pittsburgh Rolls Corp.

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J. R. HOOVER, who has been assistant manager of chemical sales for the mechanical rubber goods division of the B. F. Goodrich Co., Akron, Ohio, for the past six years, has been made manager of that department, succeeding DR. H. E. FRITZ, who hereafter will devote his entire efforts to the sale and development of Koroseal, a new synthetic elastic material recently

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introduced by the Goodrich company.

❖ ❖ ❖

WALTER H. RASTALL, formerly chief, machinery division, Department of Commerce, 5357 Reno Road, N. W., is now engaged as a manufacturer's agent in Washington, and is introducing certain special machinery into Government operations.

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WILLIAM H. DRISCOLL, formerly vice-president in charge of mechanical equipment with the Thompson-Starrett Co., has been made vice-president in charge of construction of the Carrier Corp., Newark, N. J. He received his formal education in Jersey schools, at Cooper Union and Mechanics Institute. He has specialized in heating and ventilating and is a past-president of the American Society of Heating and Ventilating Engineers.

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FRANKLIN G. SMITH was the guest of honor on Jan. 30 at a luncheon, given by executives and employees with 25 years and more of service, on the occasion of his completion of 45 years as executive head of the Osborn Mfg. Co., Cleveland.

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ARTHUR E. GAYNOR has been appointed manager of the New York office of John A. Roebling's Sons Co., Trenton, N. J., succeeding the late W. P. Bowman.

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FRANK J. REYNOLDS, until February 1, County Agent of Polk County Farm Bureau, Des Moines, Iowa, has joined the staff of the American Steel & Wire Co., United States Steel subsidiary, as manager of the agricultural extension department. Mr. Reynolds was born in Clarksburg, W. Va. He is a graduate of Iowa State College of Agriculture. The offices of the Agricultural Extension Department will be located in Chicago.

FRANK J. REYNOLDS

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H. F. HENRIQUES and J. J. LINCOLN, JR., have been appointed assistant general sales managers of Air Reduction Sales Co., New York, with headquarters in Cleveland and Pittsburgh respectively. Mr. Henriques has been a member of the sales department of Air Reduction since 1929 and manager of the Cleveland district since 1934. Mr. Lincoln joined the company in 1924 and was appointed manager of the Pittsburgh district in 1934. J. M. DRISCOLL has been made acting manager at Cleveland, and S. D. EDSALL has been appointed in a similar capacity at Pittsburgh. A. W. BROWN has become assistant railroad sales manager, with headquarters in New York. J. F. PRYOR, formerly assistant to the general sales manager, has been made vice-president of the Magnolia Airco Gas Products Co., a Texas corporation handling all of Air Reduction's activities within that state. Mr. Pryor will make his headquarters in Houston.

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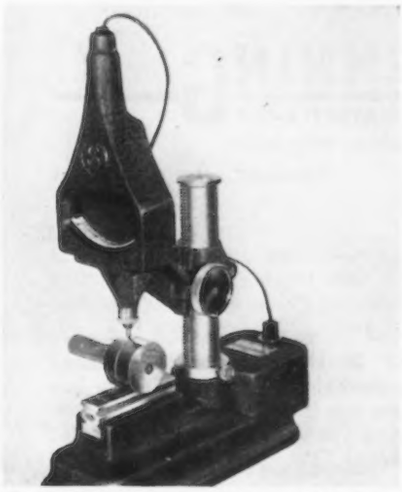
WILLIAM L. WEAVER, who has been associated with the Ludlum Steel Co., Watervliet, N. Y., since

The 3,000 Visual: Magnification, 3,000 to 1. Capacity, 5⅞ in. Range, 0.0013 in. Total length of scale, 4 in. Smallest graduation, 0.000025 in.



The 2,000 Visual: Magnification; 2,000 to 1. Capacity, 5⅞ in. Range, 0.002. Total length of scale, 4 in. Smallest graduation, 0.00005 in.

The 1,000 Visual: Magnification, 1,000 to 1. Capacity, 5⅞ in. Range, 0.004. Total length of scale, 4 in. Smallest graduation, 0.00010 in.

The 500 Visual: Magnification, 500 to 1. Capacity, 5⅞ in. Range, 0.008 in. Total length of scale, 4 in. Smallest graduation, 0.00010 in.

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1920, for the past few years as special representative, has been made manager of stainless steel casting sales. D. M. SCOTT is to be in charge of stainless steel foundry operations at Buffalo.

❖ ❖ ❖

F. C. HOLMGREN, salesman for the A. F. Holden Co., metallurgical engineer, New Haven, Conn., has also been given charge of the New York and Philadelphia territories.

❖ ❖ ❖

J. R. GOODWIN, of the Dunbar Engineering Co., New York, has been appointed New York representative for the Geo. P. Reintjes Co., Kansas City.

MANUFACTURERS' REPRESENTATIVE

Established ten years, having a good record of sales performance and now successfully representing two prominent metal fabricating concerns, desires to represent a large manufacturer of metal products in the metropolitan area.

ADDRESS BOX R-947
Care *The Iron Age*, 239 W. 39th St., New York

V. O. JOHNSTONE has resigned from the Babcock & Wilcox Co. to become associated as district sales manager with the Standard Tube Co., Detroit. He entered the seamless field at the close of the World War with the old Standard Seamless Tube Co., now Spang-Chalfant, Inc., and later became associated with the Pittsburgh Steel Co.

❖ ❖ ❖

EDWARD B. ROOT, for the past five years an interested worker in the development of the school of air conditioning jointly sponsored by Michigan State College and the National Warm Air Heating and Air Conditioning Association, has joined the Dail Steel Products Co., Lansing, Mich., as heating engineer for the Midwest.

❖ ❖ ❖

ELLIOTT G. JOHNSON has returned to the Homestead Valve Mfg. Co., Coraopolis, Pa., as advertising manager, after four years' leave of absence, during which he served with the Navy as ordinance engineer.

❖ ❖ ❖

THOMAS P. KIRK, who has been assistant purchasing agent of Laclede Steel Co., for the last 13 years, has been appointed purchasing agent, effective immediately, in place of S. W. Manss who has resigned. Mr. Kirk joined the company in 1919.

Unemployment and Business Recovery

CONTINUED increase in business activity at the same rate as between 1933 and 1936 will make a general labor shortage highly probable by 1940, and compel drastic reconsideration of policies affecting working hours, employment, and improvement of productive efficiency in industry, if the American standard of living is to be maintained.

This conclusion is the result of a comprehensive study of unemployment and business recovery made public today by the National Industrial Conference Board.

The Conference Board's study further emphasizes that there are no grounds for the assumption that the United States is destined to carry a permanent body of unemployed at public expense, if business recovery continues in the next four years at the same rate as in the past, or even at the normal rate.

The average number of employed workers in 1936, according to the Conference Board's estimates, was

Heavier Cuts at Higher Speeds

Operation: Surface Milling.
Machine: Brown and Sharpe, No. 22 Plain Milling Machine.
Material: Machining Steel.
Stock Removal: .060 inch.
Spindle Speed: 108 R.P.M.
Cutting Speed: 100 feet per minute.
Feed: 11 inches per minute.
Cutting Lubricant: 1 part Sunoco to 25 parts water.

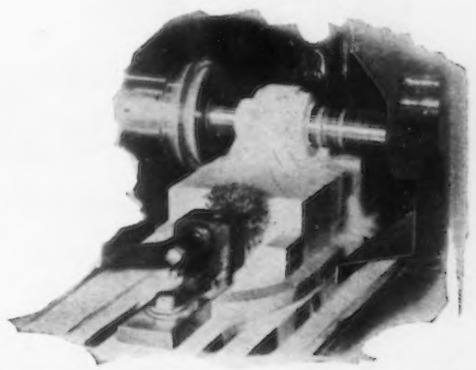
Courtesy of
Brown and Sharpe Manufacturing Co.
Providence, R. I.

FOR difficult "hogging" out of stock in rough cuts, and to help achieve maximum production in milling operations, Sunoco has long been the choice of leading machine shops.

On the finer work, continuous accuracy and superior finish are assured with Sunoco.

Your cutters, aided by Sunoco, will produce more pieces per cutter grind, and the cutter cost per piece will thus be reduced. Cutters will not burn, chips will not seize, and the cuts will be clean and even.

Under actual operating conditions, Sunoco has shown time and again that its lubricating and cooling characteristics help milling cutters give the quantity and quality of production which modern machine shop practice demands.



Operation: Climb Milling.
Machine: Brown and Sharpe No. 12 Plain Milling Machine.
Material: Tool Steel.
Stock Removal: .250 in.—.375 in.
Spindle Speed: 95 R.P.M.
Cutting Speed: 85 feet per minute.
Cutting Lubricant: 1 part Sunoco to 25 parts water.

SUN OIL COMPANY, PHILADELPHIA, PA., U. S. A.

Subsidiary Companies:
Sun Oil Co., Ltd., Montreal, Toronto • British Sun Oil Co., London, England

SUNOCO
EMULSIFYING
CUTTING OIL

42,920,000. Continued increase in the total volume of production and trade and of output per man-hour at the same rate as since 1933, with the currently prevailing hours of work, would require the following number of workers in the years immediately ahead:

1937	45,519,000
1938	48,335,000
1939	51,418,000
1940	54,802,000

Taking into consideration the net annual increase in the labor force due to the addition of new workers with increase in the population, the Conference Board estimates that the total number of available workers in 1937 will approximate 53,200,000; in 1938, 53,900,000; in 1939, 54,500,000; and in 1940, 55,200,000.

Subtracting from these figures the estimated total employment in each year, the Board estimates that under the assumed conditions the total number of unemployed, or the total available labor surplus, would average approximately 7,700,000 in 1937, 5,600,000 in 1938, 3,100,000 in 1939, and a little less than 400,000 in 1940.

The Conference Board points out that these estimates make no allowance for any temporary unemployment due to seasonal operation, sickness, or short-period shifts from one job to another. The best available estimate of the number of workers who normally are not and cannot be employed for these reasons is continually around 2,000,000. If this number is subtracted from the figures given above, it appears that the total actual available labor surplus would not exceed 3,600,000 in 1938 and 1,100,000 in 1939. In 1940 there would be a deficit or shortage of 1,600,000 active workers, if the volume of production and trade and the output per man-hour continued to increase annually till that year at the same rate as since 1933, with working hours maintained at the 1936 level.

Even if working hours should increase, however, at the same rate as between 1933 and 1936, the Conference Board estimates that there would be a shortage of approximately 600,000 workers in 1940.

Under these conditions the Conference Board points out that it would be necessary in a comparatively few years to draw more largely on the labor of women and of younger and older persons, to speed up productivity by large new investment in technological improvements, or to increase working hours, if the rate of increase in production and trade and the standard of living were to be sustained.

The prospective labor shortage would not be felt equally in all fields, according to the Conference Board. It seems probable that unless man-hour productivity in manufacturing were greatly increased or hours lengthened, the manufacturing industries might in course of time draw workers out of other fields, or the normal shift from the manufacturing industries to other fields would be slowed up. It also seems probable that the shortage of skilled labor already felt in certain manufacturing industries may become more widespread and severe unless measures are taken to offset it.

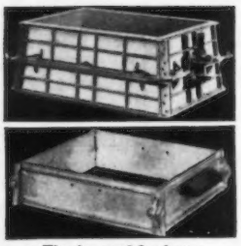
Enamel Institute to Hold Chicago Meeting

THE Porcelain Enamel Institute, Chicago, has made tentative plans to hold its seventh annual meeting in Chicago this year on Oct. 12 and 13. Plans were discussed at the meeting of the institute's executive committee in Cleveland on Jan. 27, and it was announced that, as a special feature of the forthcoming Chicago conference, the committee had issued invitations to members of the Institute of Vitreous Enamelers of England to attend.

"Members of the English association have been contemplating a trip to this country for some time," a committee spokesman declared. "We are happy to know that they will be with us in Chicago as a finale to their plant visitation in this country."

At its Cleveland meeting the executive committee of the institute discussed and approved several other important projects. Tentative plans for a nation-wide "porcelain enamel week" were laid down; consideration of the architectural market as an outlet for porcelain enamel products was given; renewal of the research fellowship at Ohio State University was approved; and the creation of an associate membership was voted. It was decided to conduct the institute's newly created forum along slightly revised lines on May 5, 6 and 7 at the University of Illinois.

Blast Cabinet


Flasks and Jackets

Rod Straightener

WHEN JUDGED BY RESULTS ONE ALWAYS EXCELS!

Core Machine

Important American Line Equipments! Here are five of American's time-saving units. The American Rod Straightener—a fast, efficient device for bending gaggers, cutting and straightening wires and rods. The American Core Machine—a high speed, low cost unit for making stock cores in many shapes and sizes. An American Blast Cleaning Cabinet—one of many types and sizes available for blast cleaning of castings and small parts of many materials. American "Featherweight" Flasks and Jackets—the ideal combination for fast economical production of small to medium size bench and floor molds. These are just a few of those important accessory equipments that are American specialties.

Almost every foundry and metal working shop executive is acquainted with the major equipments of the American Line—WHEELABRATORS, dustube Collectors, and Sand Cutters. But the many accessory units of the American Line are just as important in their applications and just as effective in cutting production costs.

May we send you descriptive literature on any unit or machine of the American Line?

THE AMERICAN FOUNDRY EQUIPMENT COMPANY
510 So. Byrkit St., Mishawaka, Indiana

Makers of Abrading Equipment for every metal cleaning operation — dustube collectors, sand cutters, and other foundry equipments.

..TRADE NOTES..

Tainton Research Corp., 3100 Elm Avenue, Baltimore, will be known hereafter as Tainton Products, Ltd.

Emerson Electric Mfg. Co., St. Louis, has moved to new quarters at 1824 Washington Avenue.

Monarch Machine Tool Co., Sidney, Ohio, has opened a Pittsburgh office in the Chamber of Commerce Building. Elmore L. Ross is in charge.

Swan-Finch Oil Corp. has moved its New York offices to 30 Rockefeller Plaza.

Salem Engineering Co., Salem, Ohio, has moved to 521 East State Street.

Taft-Pierce Mfg. Co., Woonsocket, R. I., has been appointed exclusive distributer of Webber gage blocks.

New York Belting & Packing Co., 1 Market Street, Passaic, N. J., has appointed Crerar, Adams & Co., 3550 to 3558 South Morgan Street, Chicago, as distributers of company's complete line of mechanical rubber goods.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., has purchased the complete line of pneumatic controls manufactured by the National Regulator Co., Chicago.

Risdom Mfg. Co., Naugatuck, Conn., has purchased Consolidated Safety Pin Co., Bloomfield, N. J., from Chase Brass & Copper Co., Waterbury, Conn. Part of business will be moved to Waterbury and part to Naugatuck.

Pratt & Whitney Co. of Massachusetts, 161 Brookline Avenue, Boston, machine tools, has leased space in the Kendall Square Building, Cambridge, Mass.

Lincoln Electric Co., Cleveland, has appointed to the sales staff of its Chicago office, 1455 West 37th Street, Robert A. Wilson, George Mandula and A. T. Cox, Jr. B. J. Brugge has been added to the Los Angeles sales organization as a welding expert.

Medart Co., Potomac and DeKalb Streets, St. Louis, has opened a district sales office in the Dierks Building, Kansas City. W. A. Crooks is in charge.

Tube-Turns, Inc., Louisville, Ky., has moved to 224 East Broadway.

Dardelet Threadlock Corp. has moved New York office to 55 Liberty Street.

Pressed Steel Car Co., Inc., has moved New York office to 230 Park Avenue.

Lloyd B. Edwards Co., 840 Lumber Exchange Building, Minneapolis, has been appointed agent for the Harnischfeger Corp., Milwaukee, to sell overhead cranes, hoists and motors in Minnesota, North and South Dakota.

Westinghouse Electric & Mfg. Co. will move its Pittsburgh office and some of its general offices now located at East Pittsburgh, to the Union National Bank Building, in Pittsburgh. Occupying nine floors of the building, from the fifth to the thirteenth floors, the Pittsburgh district office, subsidiary district offices and headquarters offices, including executive, legal, industrial relations, sales and accounting departments, will be centrally located in the Union Bank Building to facilitate their operations. Formerly the company's district office and subsidiary offices had been in this same building. The move will be made about May 1.

Maehler

BOX — CONVEYOR — SEMI-CONTINUOUS
MULTIPLE PASS-OVENS
GAS — ELECTRIC — OIL OR STEAM HEATED
FOR
JAPANNING
ENAMEL BAKING
CORE BAKING
DRYING & FINISHING
WRITE FOR CATALOGUE

THE PAUL MAEHLER COMPANY
2220 W. LAKE ST. — CHICAGO

Ovens

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Specialists in

Alloy and Tool Steel

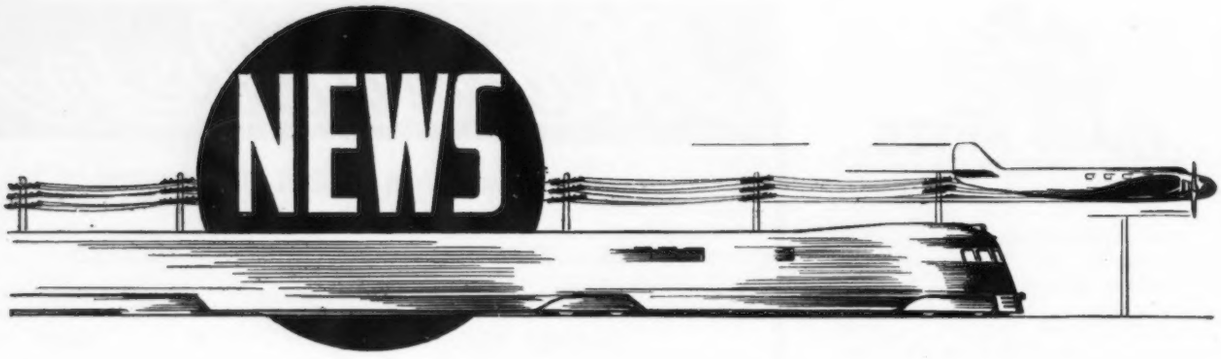
TUBING

Our concentration on tubing enables us to give customers the benefit of our special skill and experience. Large stocks available for immediate shipment—Tool Steel Tubing, Ball Bearing Tubing, Stainless Tubing, Aircraft Tubing, Hypodermic Tubing, Cold Drawn Mechanical Tubing, A.S.M.E. Boiler Tubing.

May We Serve You?

THE BISSETT STEEL COMPANY, Cleveland, O.

The Tubing Specialists



Bendix Aviation to Build New Plant

THE 500-acre Teterboro, N. J., airport will become the center of the aeronautical operations of the Bendix Aviation Corp., which plans to erect on the site a $3,000,000 "aviation city" composed of a factory building 600 by 700 ft., an engineering and laboratory building, an administration and general office building, and a large foundry for the making of alloy metal castings, Vincent Bendix, president, announced last week.

Blueprints for the project have been completed and construction will start as soon as weather conditions permit. It is not yet definitely known when bids will be advertised for the general contract, but it is believed that they will be called for in the early spring. Occupancy of the first of the units will be possible within 60 days of the start of building, Mr. Bendix said, adding that about 2500 persons would be employed at the beginning of operations. It is planned to move the working force and operations of the Eclipse Aviation Corp., East Orange, N. J., a Bendix subsidiary, to the Teterboro location when available, although none of the other plants of the company will be affected.

Of more than 500 acres of land under option to the Bendix interests, 100 acres has been purchased from the Riser Land Co., and a three-year option is retained by the corporation on the remaining 400 acres which comprise Teterboro airport.

The foundry to be established on the property will produce for Bendix and the aviation industry in general, magnesium, duralumin, aluminum and other alloys used in the manufacture of aircraft equipment.

Ford Building Two Welded Ships

TWO new canal motor ships, the largest of their kind ever built for service on the Great Lakes, are now being constructed for the Ford Motor Co. by the Great Lakes Engineering Works, River Rouge, Mich. Welding is being used throughout and these will be the first freight carriers on the Great Lakes having no riveting in hull and deck structure. These ships will be 300 ft. long, have a 43-ft. beam and 20-ft. depth in keeping with the limitations of the locks in the New York State canal system through which they will go in plying between Dearborn, Mich., and the Ford plants on the Atlantic seaboard. The first ship is scheduled to go into service about June 1 and the second about June 15.

The new boats will consume about 950 ton of steel each in their construction. Freight capacity is 2200 tons, enabling them to carry nearly 2000 V-8 engines and axles for assembling 2000 V-8 Ford cars and trucks. Each ship will be propelled by two 600-hp. diesel engines with a three-to-one gear reduction from engine to propeller. In many respects the new marine carriers will be much like the Chester and Edgewater, which were the largest gear turbine propelled steamers in the world and which were constructed for Ford in 1931. Like these boats, the new motor ships will have disappearing superstructures to enable them to pass beneath bridges only 15 ft. above water level.

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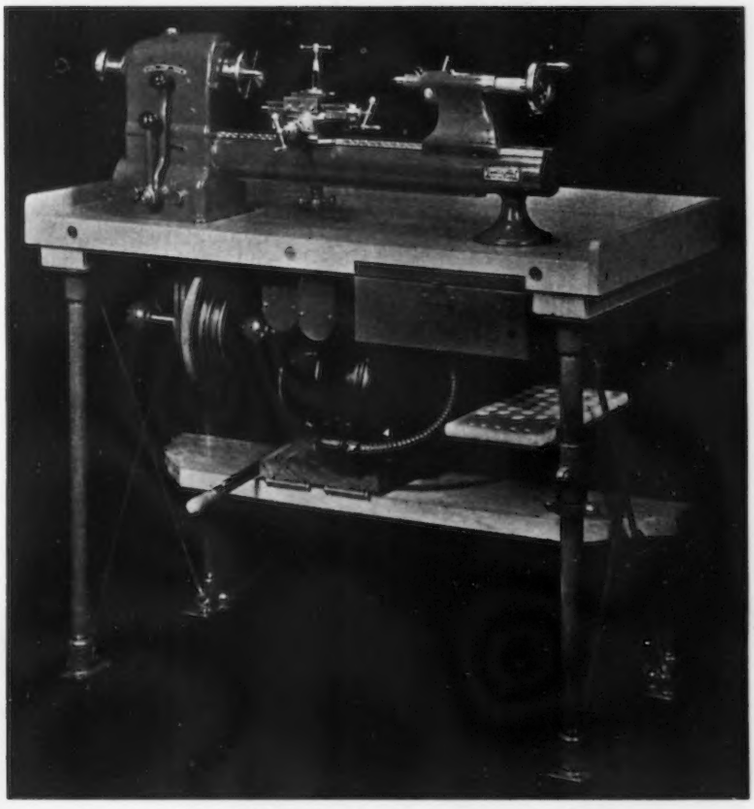
Your TOOL MAKERS can do BETTER WORK FASTER

Every toolmaker takes pride and pleasure in turning out good work *quickly*—especially when provided with equipment that gives him every possible advantage and convenience. Alert executives, everywhere, are now helping their toolmakers to *cut costs* by providing them with *Hardinge Precision Bench Lathes and Milling Machines.* Study the advantages listed below, and you'll easily understand why.



Hardinge "CATARACT" Ball-Bearing Precision Bench Lathe Unit.

HARDINGE "CATARACT" Enclosed-Head Ball-Bearing Precision Bench Lathe

Preloaded, duplex, double-row ball bearings in fully enclosed headstock, give extreme accuracy with positively no radial or end play. Turns perfectly true pieces. No adjusting of bearings—spindle not subject to bearing wear—permits use of modern tungsten carbide and diamond tools—produces excellent finish without polishing—modern electrical driving unit—high spindle speeds with six or eight speeds forward and reverse—brake for quick stopping of spindle—five sizes: ½" to 1" collet capacity, 7" to 9" swing—rigid construction, smooth performance and long life. Ask for Bulletin B3.

Hardinge "CATARACT" MD5 Precision Milling Machine.

HARDINGE "CATARACT" MD5 Precision Milling Machine

Enclosed headstock with connected bearings permits high spindle speeds with extreme accuracy—modern electric unit (enclosed in base) together with enclosed vee belt drive, gives six forward and six reverse spindle speeds.—Feed Screws revolve in long adjustable nuts and have friction dials graduated to thousandths of an inch. Compact dimensions save space and promote convenient operation. Longitudinal travel 12", Traverse travel 6½", Vertical travel 7½". Centers swing 6" diameter. Bulletin MD5 on request.

HARDINGE BROTHERS, INC.

ELMIRA, N. Y.

CHICAGO - NEW YORK - DETROIT

HARDINGE

Midtown Tunnel to Require Much Steel

A LARGE amount of various types of steel, cast iron and related products will be required during the construction of the second tube of the Midtown-Hudson tunnel, contract for the construction of which was recently awarded to Mason & Hangar Co., Inc., builder of the first tunnel which is now nearly completed.

The cast iron for the lining of the tunnel proper was awarded some weeks ago to the Bethlehem Steel Co. No other awards of steel have been made, but some announcements in this connection are expected late this week or early next week.

About 1710 tons of structural steel will be required to line the 800 ft. rock tunnel below the Palisades at Weehawken, and the New Jersey ventilating shaft will need about 287 tons of shapes. The caisson for the New York shaft will use 1255 tons of structural material, while an additional 1056 tons will go into roadway beams. Structural steel for tie-rod assembly anchors amounts to 1025 tons, making a total for the project of about 5300 tons of structural steel.

Steel curbs will be made of 346 tons of ⅜-in. plate bent to conform to the proper angle.

Tie-rod assemblies, which number 2230 and weigh 225 lb. each exclusive of their 830 lb. structural steel anchors, will be made of heat-treated steel. Total steel required, exclusive of anchors, is 501,750 lb., or about 250 tons.

Exhaust air ports will require 145,000 lb. of gray iron castings, and 30,000 lb. of stainless steel. Lining the length of the tunnel will be 1200 fresh air flues, composed of about 100 lb. of 20-gage sheets and 20 lb. of malleable iron each, a total of 120,000 lb. of sheets and 24,000 lb. of malleable castings. Ceiling hangars will be made of stainless steel and will consume some 21,000 lb.

Man hole frames will require 38,300 lb. of cast iron while the covers will use 15,500 lb. of cast steel.

The tunnel will need 673 tons of steel reinforcing bars, and 1700 tons of heat-treated tunnel bolts.

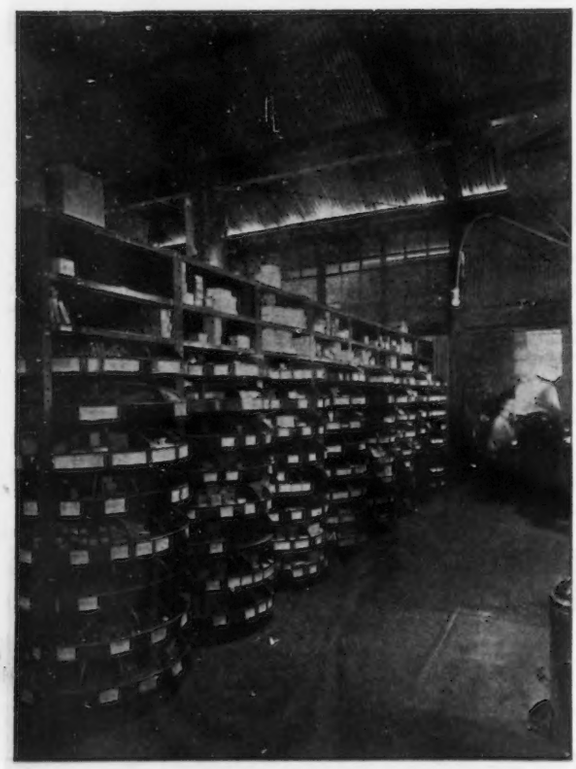
About 215 tons of cement-lined cast iron pipe will be used, 2200 lb. of unlined pipe, and 4000 lb. of wrought iron pipe. Miscellaneous uses will consume 30,300 lb. of brass and copper pipe, while a conduit will require 125 tons of galvanized steel.

Controlled relay signal junction and light boxes will take 48,000 lb. of cast iron, and valves and dresser couplings will require 5800 lb. of the same material.

Miscellaneous steel, mostly copper bearing, to be used on the job, amounts to 103 tons.

William E. McFee, American Rolling Mill Co., Middletown, Ohio, president of National Industrial Advertisers Association, Inc., announces the selection of the Edgewater Beach Hotel, Chicago, as the meeting place for the 1937 conference of the National Industrial Advertisers Association, on Sept. 23, 24 and 25.

"ROTABINS"



ROTABINS WITH SHELVING

Do You Need Space in your Stock Rooms or Tool Cribs?

PIONEERS	In the development—design—manufacture and installation of sectional rotating steel storage bins and shelving.
WE SURVEY	Your storerooms and tool cribs. Your line production and bench assembly groups.
WE STUDY	Your requirements and submit plans for your consideration.
WE DESIGN	Equipment to meet your needs.
WE SUPERVISE	The rearrangement of your bins and the installation of our equipment.
WE SAVE	You *time—labor* and an average saving of 50% *floor space* in stowing all binable material.

Write us for information without obligation

THE FRICK-GALLAGHER MFG. CO.

WELLSTON OHIO

Machinery Credit Men to Meet

MACHINERY manufacturers have scheduled a series of meetings of the credit men of the industry during the seventh Credit Congress of Industry, which will be held in conjunction with the forty-second annual convention of the National Association of Credit Men, at the Hotel Stevens, Chicago, June 21 to 25.

This group of credit executives is headed by H. E. Kay, credit manager, Industrial Brownhoist Corp., Bay City, Mich., as National chairman. Mr. Kay expects the largest attendance in the history of the Machinery Manufacturers Division and urges every firm in the industry to send credit executives. A tentative program of the group meetings has been prepared and a copy may be obtained by writing to the National chairman.

Armco Credit Unions Help Employees Save

A REPORT from the American Rolling Mill Co., Middletown, Ohio, reveals that during 1936 the four company-sponsored credit unions showed a 59 per cent increase in savings. With a membership of 58.5 per cent of all eligible employees, the value of shares bought in 1936 totaled $498,833, compared with $312,360 in 1935. Employees transacted business amounting to $1,500,784 during the year.

Operated and controlled by employees solely, the credit unions were instituted in 1932 by the company to enable workers to obtain small loans at reasonable interest rates and to make small profitable investments.

Goddard & Goddard Co. Wins Safety Trophy

GODDARD & GODDARD CO., INC., Detroit, manufacturer of milling cutters, is the winner of the F. A. Morrison trophy for the best record, based on severity, in the interplant safety contest of the Detroit Industrial Safety Council for the year 1936. The company recorded no lost-time accidents during the year. In congratulating his employees on this achievement, A. N. Goddard, president, had this to say in a bulletin board announcement:

"Quite aside from the sentiment of this enviable position, I think of the practical aspect of no dismembered or disfigured bodies in our group; no long hours or weeks of pain and suffering resulting from an accident; no loss of time from your job; in short, no negatives, no losses to our entire personnel because of an accident in our plant this past year. This means that you have used reason and care in all your work. You have been thoughtful not only of your own welfare but equally of the welfare of each other. On the company's part we have endeavored to eliminate every hazardous condition whenever such might be possible. Perhaps good luck has figured in this splendid record in some measure, but very largely it has been the result of your good sense and cooperation."

The Detroit council includes 79 plants in the metropolitan area representing an employee constituency of approximately 240,000 persons.

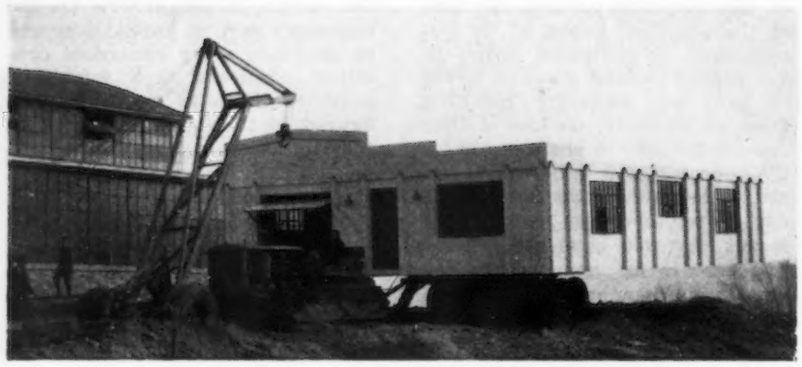
Production Facilities that give you the widest choice of sizes and shapes including cold drawn extra wide flats up to 12" x 2" . . . *Nationwide Warehouse* service through leading distributors that cuts delivery from days to hours . . . *Metallurgical Service* that helps you solve problems of structure, machinability, tensile strength, hardness and endurance values . . . three of the important factors that make Wyckoff Cold Drawn Steel Service your logical specification.

WYCKOFF DRAWN STEEL CO.

General Offices: First National Bank Building Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of Carbon and Alloy Steels Turned and Polished Shafting, Turned and Ground Shafting, Wide Flats up to 12" x 2"



Employer Builds Workers' Steel Houses

THE first of a series of all-steel, five-room houses for its employees has been completed by R. G. Le Tourneau, Inc., Peoria, Ill., maker of heavy grading machinery.

Completely built in the factory, the house was towed outside on a 16-wheel trailer to a nearby site, where plumbing and electric connections were made and the house furnished within a few hours. When the next five similar structures are completed, the six dwellings will be launched upon the Illinois River, which flows past the factory, and towed upon their own bottoms to a company colony site across the stream.

Production methods, which are being used on the houses now under construction, according to the company, are expected to permit the completion of future houses with the economy, precision and speed employed in manufacturing scrapers and other similar equipment. It is estimated that with present available space and facilities one house can be finished every three weeks. The homes were planned with the idea in mind of providing Le Tourneau employees with an attractive, average-size house that could rent or sell at a moderate figure. It is designed to utilize every foot of space and thereby afford with a modest ground area a five-room house with rooms of generous size.

Third Edition of Brady's Materials Handbook

McGRAW-HILL BOOK CO. has issued the third edition, revised, of Col. George S. Brady's Materials Handbook. This encyclopedia of materials is designed as a reference guide for executives responsible for engineering construction and product development as well as for officials in charge of purchase of materials for industrial products and projects.

In the new edition, items relating to engineering construction materials have been strengthened to include enough comparative data on the physical properties to enable the designing engineer and the architect to judge the relative merits of materials for the particular purpose in hand. Patented and trade-named materials have in many cases been grouped in their respective classifications in order to give a broader picture of particular subjects. New materials have also been added.

This encyclopedia, in handbook format, consists of 663 pages and is a valuable addition to any industrialist's reference library.

Machinery Exports Show Large Gain

EXPORTS of machinery from the United States in December were valued at $15,810,281, 28 per cent above the December, 1935, shipments which were valued at $12,360,766, according to the machinery division, Department of Commerce.

The increase was fairly general and extended over all machinery groups except "other metal-working machinery," ranging from 60 per cent in construction and conveying machinery to 9 per cent in the textile, sewing and shoe machinery group.

Machinery exports for the year aggregated $169,836,427, 30 per cent more than the 1935 total of $130,272,591. Foreign sales increased in all machinery groups, the gains ranging from 7 per cent in power-generating machinery (except electric and automotive) to 55 per cent in metal working machinery.

Large Airplane Order

TENTATIVE orders have been placed by Transcontinental Western Air and Pan American Airways for a total of 10 four-motored land planes intended for transcontinental and trans-Atlantic flying. The Boeing Aircraft Corp., Seattle, will build these 25-ton ships.

Results Are What Count

If you want real economy—look to results rather than to first cost. It is on this basis that "HERCULES" (Red-Strand) Wire Rope continues to make and hold friends. There are reasons, of course, why this wire rope is so dependable and long lasting, and we are always glad to give full details to everyone interested in saving money. Made in a wide range of constructions including Round Strand, Flattened Strand, Preformed, Non-Rotating and Steel Clad types.

"HERCULES" (RED-STRAND) WIRE ROPE

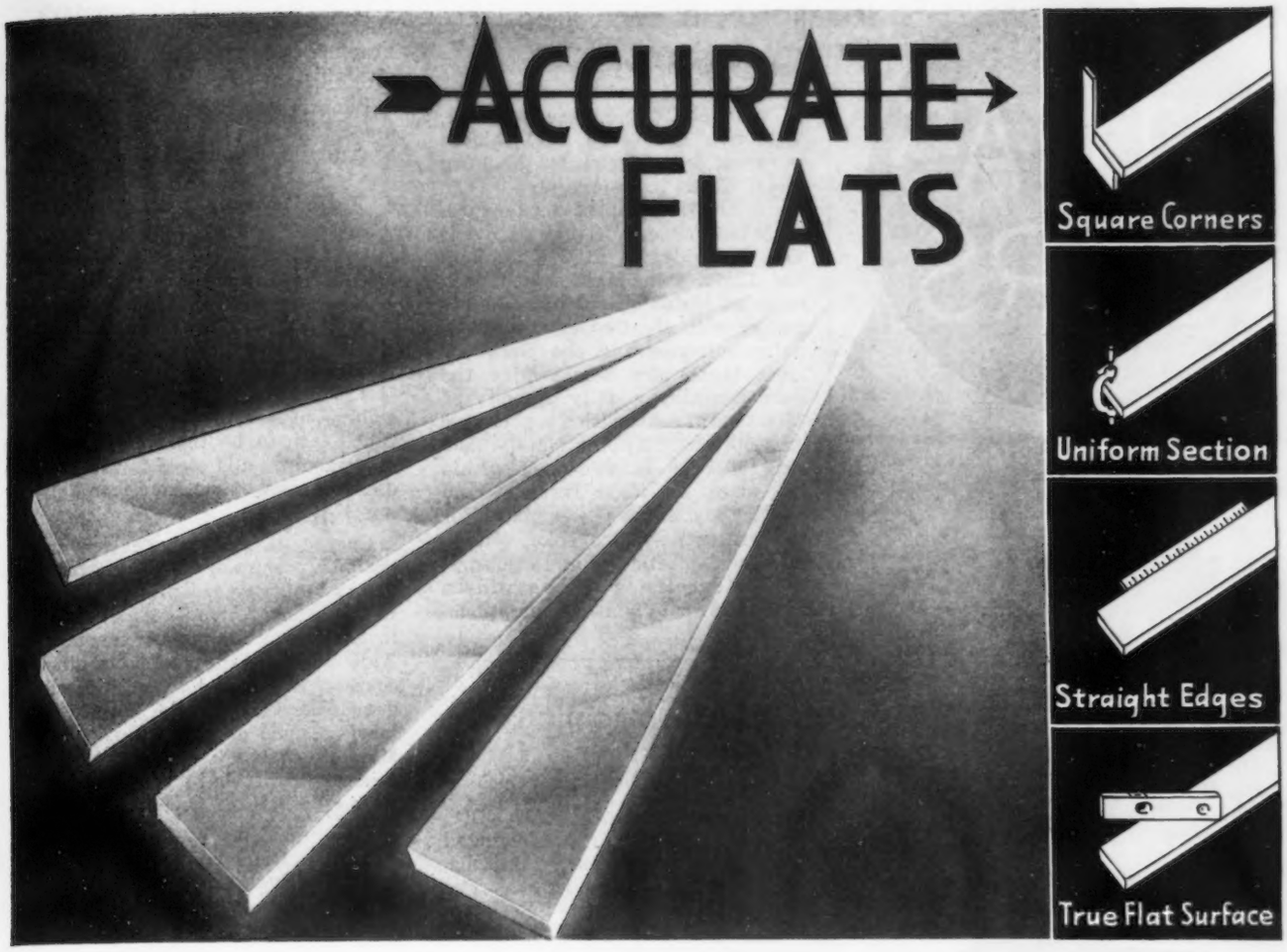
MADE ONLY BY

A. Leschen & Sons Rope Co.

ESTABLISHED 1857

5909 Kennerly Avenue, St. Louis, Mo.

NEW YORK—CHICAGO—DENVER—SAN FRANCISCO



For Quick Assembly

Check up on the various shapes of steel parts used in fabricating, and you will find that a large majority are *rectangular sections.*

These represent opportunities to utilize an economical form of *cold drawn steel*—B & L Quality Flats, Wide Flats and Extra Wide Flats.

Cold drawing increases their strength, improves their machinability, and brings them within the standard commercial tolerances required for precision applications.

They need little or no machining, and their accuracy saves valuable time in close fitting assembly work. It is good shop practice to use them for bed plates, die backing, door runners, mountings for jigs and fixtures.

An extensive size range offers "A Flat for Every Job"—Standard Commercial Flats 1/8" x 3/16" to 3" x 6"—Extra Wide Flats 6" to 12" and 1/4" to 2" thickness. Distributors from coast to coast stock these steels for immediate delivery.

Analysis, standard or modified, but regularly furnished in either SAE 1020 or SAE X-1020. Details on request.

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Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

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Engineers - Manufacturers

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Ford's New Coke Ovens Fired

ON Feb. 16 and 23 respectively, two new coke oven blocks were put into service by the Ford Motor Co. at its Rouge plant. The ovens are the Koppers-Becker type, each battery comprising 61 ovens 17½ in. wide, 40 ft. 3½ in. long and 13 ft. 3 in. high. Each oven takes an 18-ton charge of coal. Together with the two existing Wilputte batteries and one Solvay type, these new blocks give the Ford company a daily capacity of 3300 tons of coke, with a coal charge of 4400 tons. Approximately 1500 tons of coke is consumed within the plant for blast furnaces and cupolas and in the power plant. For the present, surplus coke will be sold for domestic use and eventually metallurgical grades will be available for outside consumption.

Bantam Company Changes Name

BANTAM BALL BEARING CO., South Bend, Ind., has changed its name to more clearly describe its present day production. The new name is the Bantam Bearings Corp.

When the original company was organized 40 years ago the entire business was devoted to the production of ball bearings. Later Bantam pioneered in roller bearing manufacture. Since that time the acceptance of this type of bearing has grown to the point where over 90 per cent of the company's business is now devoted to the manufacture of taper roller and straight roller bearings.

Bantam Bearings Corp. is now a subsidiary of the Torrington Co., Torrington, Conn.

'SITTING DOWN' HIS ONLY JOB

A "sit-down striker" was the "occupation" given by a character witness in a hearing yesterday conducted by Examiner H. J. Kirkwood in the local office of the Immigration and Naturalization Bureau.

Edward Harris, a Negro, of Webster Avenue, appearing in behalf of an applicant for citizenship, was questioned by the examiner, as follows:

"What is your occupation?"

"I am a sit-down striker."

"What company did you work for?"

"None. I just sit down and don't work."

The examiner has the application under consideration.

Pittsburgh Sun-Telegraph, Feb. 14.

Scrap Company Formed To Supply Middletown

THE Middletown Iron & Steel Co. has been formed as a subsidiary of the David Joseph Co., Cincinnati, to be the sole supplier of scrap iron and steel to the Middletown plant of the American Rolling Mill Co.

George L. Sturm, president of the new company, has announced that a modern yard at Middletown will be in operation by April 1, and in the meantime, requirements of Armco will be supplied from other sources. The David Joseph Co. will dismantle its yard at Youngstown, moving some of the equipment to Middletown. Site for the yard is to be made available by the American Rolling Mill Co.

Vice-presidents of the new company are, Delmer C. Lee and William E. Fertel, the latter formerly at the Youngstown branch of David Joseph Co.

Employment Rising In Machinery Trade

PAYROLLS and employment in the machinery industries are rapidly improving, according to the January issue of *World Machinery News*, and in several branches conditions are better than during the 1923 to 1925 period, which is considered normal by the Bureau of Labor Statistics. According to the bureau's figures, an average of 885,500 workers was employed in the manufacture of machinery during these years, and earned an aggregate weekly payroll of $23,830,000. The weekly payroll now is calculated to be $25,069,000 for November, 1936, and the number of employees has risen to 984,700 for the same month.

Export shipments from the United States of eight classifications of tools dropped to $13,534,502 during November from the year's high of $16,003,332, which had been established the previous month. The 11-month total declared export value amounted to $154,024,261, while during the entire year of 1935, exports totaled only $121,867,680.

...OBITUARY...

CHARLES P. PERIN, consulting engineer who did extensive development work in Asia, Africa, Europe and the United States, died at his home in New York on Feb. 16, aged 75 years. He was president of the Perin Engineering Co., New York, and had done notable work in iron and steel. Dr. Perin was graduated from Harvard College in 1883 and continued scientific studies there for a year afterward. After leaving school he became identified

CHARLES P. PERIN

with the Carnegie Steel Co., of which he was successively chemist, superintendent and general manager of blast furnaces and steel works in various plants in Alabama, Kentucky and Tennessee. He became a consulting engineer in 1900. The following year he became consultant for an Indian group, and later built a steel plant for the Tata Iron & Steel Co., Ltd. Later he was consulting engineer for the Mysore Iron & Steel Works. Dr. Perin was also responsible for the building of two blast furnaces in China and his firm was retained by the Japanese Government to rebuild blast furnaces of the South Manchuria Railway. His firm did some work for the Soviet Government in connection with the development of the Russian steel industry. In 1919 he was chief engineer of the appraisal commission attached to the Peace Commission. Dr. Perin was a past-president of the American Institute of Consulting Engineers, the American Iron and Steel Institute and the Harvard Engineering Society.

ROBERT W. GOTSHALL, general sales representative for the Caterpillar Tractor Co., died in St. Francis Hospital, Peoria, Ill., on Feb. 11, aged 55 years.

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CHARLES M. PEABODY, vice-president of the Nukem Products Corp., Buffalo, died on Jan. 31 while on a visit in France.

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AMOS NORTHUP, chief designer of the Murray Corp. of America, Detroit, died on Feb. 15 as a result of a fall on ice. Mr. Northup, who was 48 years old, was regarded as one of the outstanding automobile designers in the world. He had been connected with Murray for 10 years and was also responsible for the design of the 1937 Willys car. He is credited with being the originator of the town car or cadet type automobile front and was the first to place bright color combinations in production. In 1935 he designed a streamlined ocean liner

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Detrex Solvent Degreasing—

Showing rapid condensation and washing effect produced on heavily oil-coated work that is immersed in pure solvent vapors.

In less than a minute, work is removed clean and perfectly dry. Work may be handled by conveyor, hoist, or hand—with baskets, racks or hooks.

Simplest and Most Rapid method of cleaning metal products.

Used on all kinds of metals . . . without fuss, muss, or extra drying operations.

Provides a surface that is perfectly free of oil and grease . . . as is required for all finishing, inspection, heat treating, and rust proofing operations.

Complete line of degreasers ranges from small, hand-operated units to large completely automatic conveyorized machines. All phases of degreasing . . . vapor, liquid immersion, and hot solvent spray.

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and also exhibited a streamlined train at the Century of Progress in Chicago. Mr. Northup was born in Bellevue, Ohio, and was educated there in the public schools.

❖ ❖ ❖

EDWARD M. SEXTON, railroad sales manager, Air Reduction Sales Co., died Feb. 15 in New York after an illness of several weeks. He was 56 years old. He began his career with Air Reduction in 1916 as a salesman in the Metropolitan district. Later he was appointed Chicago district manager and from this position was transferred to New York as manager of the Metropolitan district. When in 1922 the Davis-Bournonville company's personnel was merged with Air Reduction, he was selected to manage the railroad sales department, with headquarters in New York.

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MARKS ANGEL, widely known New England iron and steel scrap dealer, died suddenly at his office in Boston, on Feb. 18. He was born in Wilna, Russia, 70 years ago, and came to this country 50 years ago, starting almost immediately in the scrap metal business and subsequently becoming president of the Bay State Commercial Co. and Roxbury Iron & Metal Co.

❖ ❖ ❖

FRED B. ERB, president and general manager, Eaton-Erb Foundry Co., Detroit, died of a heart attack on Feb. 20, two hours after he had sailed on a Caribbean cruise with members of the Detroit Athletic Club. Mr. Erb enjoyed both a national and international reputation in the foundry industry due to his intense efforts in association work to promote better understanding and business relationships among foundrymen. Mr. Erb was a member of the National Founders Society, past-president of the Detroit Foundrymen's Association, past-president of the American Foundrymen's Association, and in 1929 was sent as an international delegate to the Foundry Congress in England. Mr. Erb was active in other business enterprises as an officer or director in the following companies: Newark Mfg. Co., Slayter & Co., L. A. Walden & Co., First Management Foundation.

Mr. Erb was born April 30, 1886, in Royal Oak, Mich. He was educated in the public schools of Royal Oak and Birmingham, Mich., and was graduated with the degree of Mechanical Engineer from the University of Michigan in 1908. Immediately upon leaving school, he entered the employ of the Detroit Stoker & Foundry Co. as an engineer. He quickly progressed through the various departments, and became foundry superintendent, which position he held until 1913. Mr. Erb then joined the Lakeside Foundry Co. in the same capacity until 1915, at which time he resigned and became associated with the Elmira (N. Y.) Foundry Co. He left there in 1916, and returned to Detroit to assume the position of foundry manager of the Packard Motor Car Co. In 1925 he left the Packard company and together with B. A. Joyce organized the Erb-Joyce Foundry Co., whose plant was located at Vassar, Mich. In 1932 Mr. Erb collaborated with J. O. Eaton, of the Eaton Mfg. Co., and purchased the Holley Permanent Mold Machine, Inc. These two foundries were merged to form the Eaton-Erb Foundry Co. at Vassar.

FRED B. ERB

❖ ❖ ❖

ANDREW J. PEOPLES, manager of the Detroit plant of the American Brass Co., died on Feb. 12, aged 65 years. He was born at Novi, Mich., and at the age of 20 went to Detroit as a telegrapher. Later he entered the employ of the old Detroit Copper & Brass Rolling Mills and rose to executive positions in that company until it was merged with American Brass 25 years ago. He had been manager ever since.

❖ ❖ ❖

WARREN M. MERRILL, general superintendent of the Fairbanks, Morse & Co. plant at Three Rivers, Mich., died in that city on Feb. 20.

• Men who work on assembly lines realize most keenly that there is a vast difference in cap screws, particularly if wages are paid on a piece-work basis. Cleveland Cap Screws, made by the Kaufman Process, *patented*, have accurate threads—a Class 3 fit is our standard. You can depend on it—they will fit your tapped holes. Speedy assemblies result. All heads are machined to seat properly. This feature is especially desirable in the Flat and Fillister cap screws. Specify them on your next order. Catalog "D" and price schedules on request. THE CLEVELAND CAP SCREW COMPANY, 2929 East 79th Street, Cleveland, Ohio.

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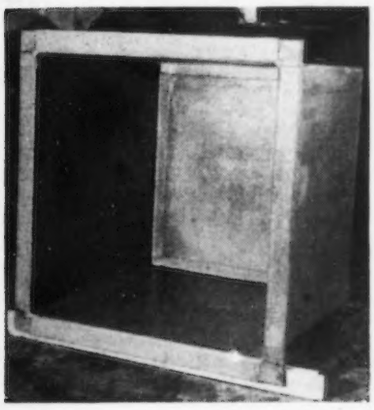
SET SCREWS • BOLTS AND NUTS

Koroseal Linings for Corrosion Protection

ONE of the newest applications for Koroseal, a synthetic rubber-like material developed by the B. F. Goodrich Co., Akron, Ohio, is its use as a lining for tanks handling severe corrosives.

Among Koroseal's outstanding properties, the manufacturer says, is its great resistance to oxidizing solutions, which makes it a desirable construction material for lining tanks and other equipment to resist nitric acid, chromic acid and mixtures of nitric and hydrofluoric acids.

Methods of attaching Koroseal to steel, wood and cement have been developed which yield very good adhesion to the base material. Lining cannot be applied to riveted tanks, but welded constructions are said to be very satisfactory. Typical installations of Koroseal lining include a steel tank for handling 67 per cent nitric acid at 130 deg. F. and a wood tank for stainless steel pickling handling a mixture of nitric and hydrofluoric acids. Both tanks have been in service for over a year and are still in excellent condition.

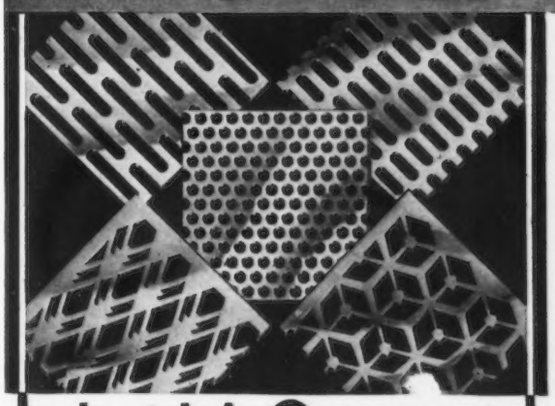


Koroseal, being rubber-like in nature, is susceptible to physical damage. It is also thermoplastic and, therefore, is not recommended by the maker for service where the actual temperature of liquids in contact with the material exceeds 150 deg. F. However, the hazards of physical damage can be eliminated by the application of brick or other protective sheathings over the lining. Where it is desired to use Koroseal in steel vessels at temperatures about 150 deg. F., sheathings of insulating material, such as brick, can be applied over the Koroseal in sufficient thickness to bring the actual contact temperature down to the required minimum.

The Goodrich company says that the repairing of a damaged Koroseal lining is an extremely simple matter. No heat or pressure is necessary. A few hours' drying time for the Koroseal liquids is all that is required, and the repair is as strong as the original material.

Harry W. Dietert Co., Detroit, has opened a new plant at 9330 Roselawn Avenue, where modern facilities are available for the production of sand, core and mold control equipment.

PERFORATED METALS



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INDUSTRIAL—Whether your screening problems include very coarse or extremely fine materials, you will obtain the best results with perforated metal. H & K screens have increasingly served in all fields of industry for many years and established an unequaled standard in lasting performance. Regardless of size, metal or perforation, permit us to discuss your requirements with you.

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A. MILNE & CO.

1887 — FIFTY YEARS OF FRIENDLY SERVICE — 1937

Colloidal Graphite as a Die-Casting Lubricant

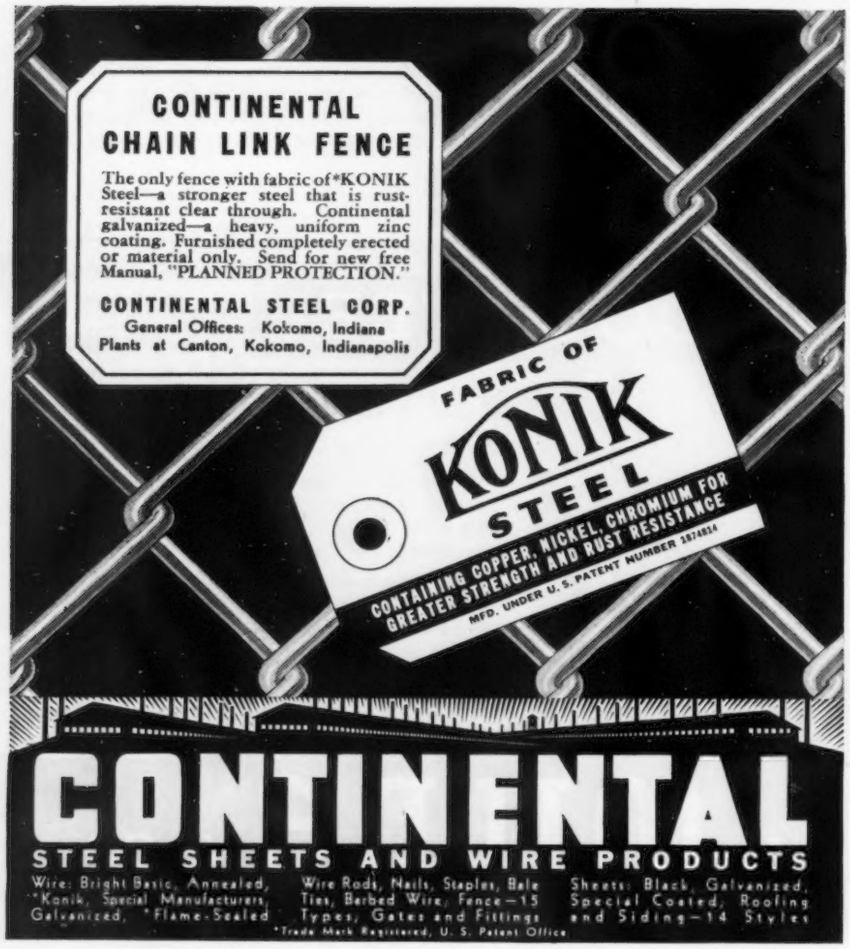
(CONTINUED FROM PAGE 41)

mate amount of borax solution is required when work is done at temperatures up to 1000 deg. C.

Where it is necessary to chill the cores after each cast, the "graphoid surface" can best be maintained by a mixture of one pint colloidal graphite to twenty gallons of water. When operating at higher pressures with various pressure machines, a solution of one pint colloidal graphite to five gallons of water has been reported as being satisfactory. Oftentimes, when making special castings, difficulty is experienced with certain metal sections due to slow chilling, shrinkage, etc. In such cases a one to ten solution of colloidal graphite and water should be used for painting on those parts of the mold where it is desired to conduct heat away rapidly or where there is a tendency for them to bind in the casting. Graphite, according to some users, readily carries the heat away in cases where heavy sections are cast.

It has been pointed out that a solution of colloidal graphite and water on dies considerably improves the formation and finish of the castings made therefrom. Other advantages of such graphite deposits are the tendency to lengthen their operating life and to reduce "scrap." Old dies which have become checked may be continued in use by treating their surfaces with concentrated colloidal-graphited water and buffing, upon drying, the graphite film which results. Since cores can be more readily removed, production is materially increased. According to many producers, graphite of colloidal dimensions is more desirable in the above respects than the flake or crystalline graphite because of its greater adhesive properties.

In conclusion, it is worthwhile noting that more efficient production can be maintained by occasionally treating with a colloidal-graphited oil the core slides, plugs, screws, hinges, or other moving parts of the die-casting mechanism. When applied to push pins, this lubricant is especially effective in the elimination of sticking. Full realization of the value of colloidal graphite dispersions for die-casting processes can only be attained following their actual shop use.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CHAIN LINK FENCE
The only fence with fabric of *KONIK Steel—a stronger steel that is rust-resistant clear through. Continental galvanized—a heavy, uniform zinc coating. Furnished completely erected or material only. Send for new free Manual, "PLANNED PROTECTION."
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STEEL SHEETS AND WIRE PRODUCTS
Wire: Bright Basic, Annealed, *Konik, Special Manufacturers, Galvanized, *Flame-Sealed
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FINANCIAL NOTES

Colorado Fuel & Iron Corp., Denver, and subsidiaries made net income of $108,263 in the fourth quarter after depreciation, depletion, Federal income taxes, etc. Net profit in the six-month period ended Dec. 31 amounted to $446,921 after similar deductions.

McKeesport Tin Plate Co., McKeesport, Pa., in its annual report for 1936 showed net profit after all charges of $1,770,314, this figure including the company's pro rata share of the undistributed earnings of its subsidiary, National Can Co., Boston, Mass., but excluding $121,485 of flood losses which were charged to surplus. Net profit for National Can Co. was shown separately at $902,993.

Continental Steel Corp., Kokomo, Ind., has declared a dividend of 25c. a share on the common stock, payable April 1 to holders of record March 15. A dividend of $1.75 a share on the preferred stock was also declared, payable at the same time.

American Can Co. made net profit in 1936 of $17,226,845 after interest, depreciation, employees' annuity fund and normal Federal income taxes, equivalent to $5.80 a share on the common stock outstanding. In 1935 net profit was $17,310,303, or $5.83 a common share.

Baldwin Locomotive Works, Philadelphia, and subsidiaries, including Midvale Co., had net loss in 1936 of $2,163,949 after all charges, compared with net loss of $2,119,738 in 1935.

Midvale Co., Philadelphia, partially owned subsidiary of Baldwin, showed net profit in 1936 of $1,266,167 after depreciation and taxes, against $496,084 in 1934.

Caterpillar Tractor Co., Peoria, Ill., had January net profit of $710,890, compared with $454,134 for January, 1936.

CANADA

. . . Industrial operations are heavier.

o o o

. . . Railroad buying has accelerated activity.

TORONTO, Feb. 22.—The placing of orders by the Canadian railroads to the value of approximately $35,000,000 has given new impetus to activities in practically all branches of the Canadian iron and steel industry and most companies now are running close to capacity. Manufacturers of cars and locomotives have booked large orders which assure continuous operations for several months. In addition some rail awards have been made as well as contracts for track supplies. Dominion Steel & Coal Corp., Sydney, N. S., started rolling on Feb. 18 on a 6500-ton rail order for the Canadian National, this being the first rolling since the order for the South African government was completed in January. Additional rail contracts are said to be pending. Both the Steel Co. of Canada, Ltd., Hamilton, Ont., and the Algoma Steel Corp., Sault Ste. Marie, Ont., are said to be operating close to capacity, with the latter rolling a 20,000-ton rail order for the C. N. R., and also producing structural shapes.

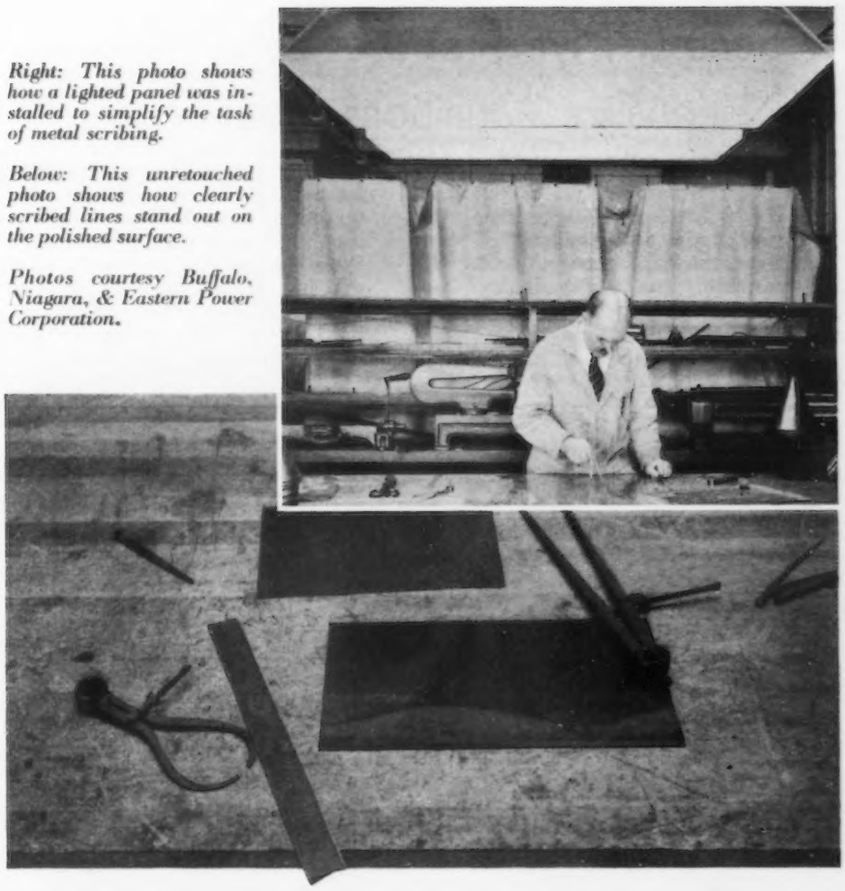
General expansion in activities in all branches of the steel industry is reflected in increased demand for merchant pig iron and local blast furnace representatives state that business today is the best since 1929. Awards are averaging better than 1500 tons per week. The steadily decreasing supply of cast scrap is responsible for heavier purchases of pig iron. It is expected that there may soon be an advance in pig iron prices.

Demand for steel scrap is fairly heavy with mills in the Hamilton and Montreal districts taking all supplies offered. Heavy melting steel is moving freely to Hamilton against contracts and local dealers state that yard holdings are being depleted steadily. There is a large supply of automobile scrap available, but as Canadian plants are being adapted to use this material dealers are getting rid of larger quantities and also are shipping to the United States.

Right: This photo shows how a lighted panel was installed to simplify the task of metal scribing.

Below: This unretouched photo shows how clearly scribed lines stand out on the polished surface.

Photos courtesy Buffalo, Niagara, & Eastern Power Corporation.



BETTER LIGHTING helps simplify exacting task

Sheet and metal scribing is very exacting work. Extreme accuracy must be maintained in scribing the lines which are often difficult to see because of the lack of contrast between the line and the surface. The metal surface frequently reflects everything within the field of view . . . ceiling, pipes, walls, bright spots from small lighting units, and even the face of the worker.

The problem of making the scribed lines stand out in bold relief from the polished surface was accomplished in one industrial plant by erecting a large lighted panel over the sheet metal table. The panel was of sufficient size so that a uniform reflection was obtained on the polished surface . . . yet its brightness was not too high for comfort. Thus, when a line is scribed on the surface, it interrupts the reflection of the panel and stands out in strong contrast.

See your local lighting company or nearest General Electric Lamp Division for help in solving specific industrial lighting problems of this kind as well as those involving entire plant lighting. And write to General Electric Co., Dept. 166, Nela Park, Cleveland, Ohio for a free copy of the illustrated booklet "Special Lighting Applications for Industrial Processes."

GENERAL ELECTRIC
MAZDA LAMPS
They stay brighter longer

Senator Nye Proposes to Nationalize Munitions Industry

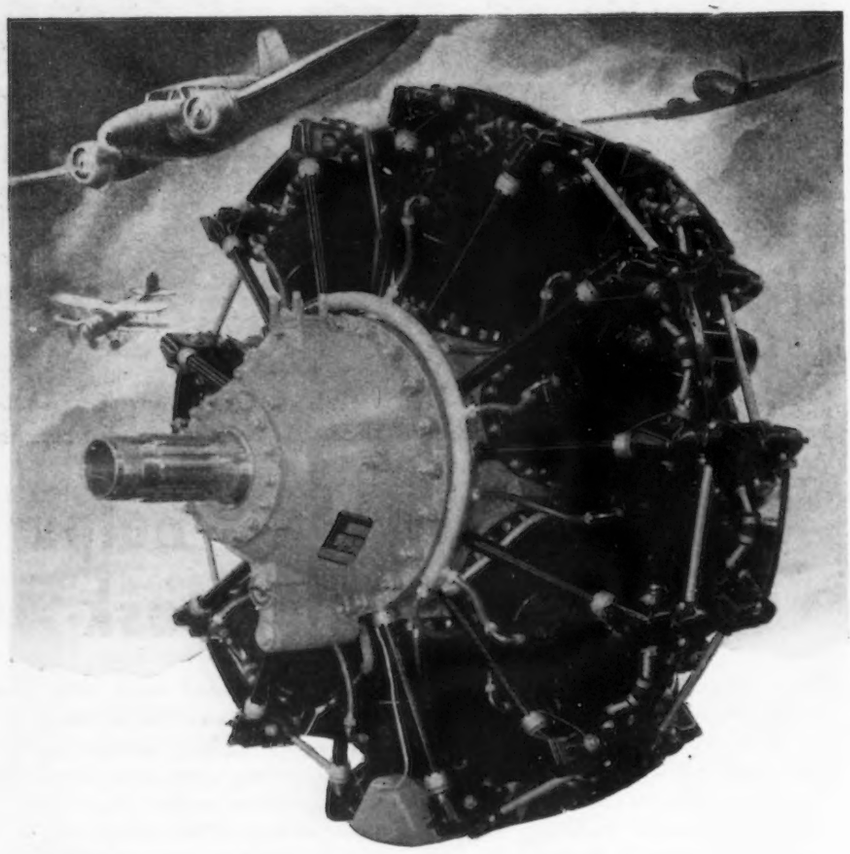
WASHINGTON, Feb. 23.—Senator Nye, Republican, of North Dakota, has made use of the difficulty of the Navy Department to get steel under the terms of the Walsh-Healey Government Contracts Act to revive a plan of himself and three Democratic colleagues on the Senate Munitions Committee to "nationalize a major portion of the munitions industry." He has announced that Senators Bone, Washington; Pope, Idaho, and Clark, Missouri, will join him in introducing legislation to this end this week. Under the bill the Government would be required to build all of its naval vessels and manufacture all of its guns, explosives, gas and armor plate. Production of aircraft would remain a private undertaking. Senator Nye and his colleagues have previously suggested such legislation.

The North Dakota Senator said: "We have Interstate Commerce Commission estimates showing that all factories necessary to supply our armament needs could be built or purchased for $23,600,000, or less than the cost of one battleship. This relatively insignificant investment would save the taxpayer enough to pay for itself in a few years and would eliminate dangerous delays in our national defense program."

Actually, the estimates, made for the Senate Munitions Committee by valuation engineers of the Interstate Commerce Commission, covered costs of equipment for existing Navy yards to produce annually one battleship, one aircraft carrier, one heavy cruiser, one light cruiser, 10 destroyers and three submarines. The engineers neither made nor attempted to make an estimate as to the cost of "nationalizing a major portion of the munitions industry," whatever that is. Obviously the figure given would not even approach such an enterprise.

It may be that equipping of Navy yards for greater production of naval vessels may be attempted and done by legislation, though there is doubt that that is an immediate prospect. If it were, it certainly would delay the national defense program if it were confined to Navy yards, because of the time that would be required for equipping the yards and their continued inadequacy to build all the ships and produce material required on schedule. The suggestion is on a par with some reports, which did not come from responsible Administration sources, that the idle armor plate plant at Charlestown, W. Va., would be re-equipped to supply all Navy steel needs, a suggestion that Government officials has declared has not even been considered.

The difficulty in getting steel for the Navy has been directly laid at the door of the Department of Labor, which administers the Walsh-Healey act, by one of the authors of the act, Senator Walsh of Massachusetts. He said the trouble is not in the terms of the act but is due to its administration. Unless the department grants exemptions as to hours the Senator has threatened to have it amended so that it would be modified or its operations entirely removed as to purchase of national defense needs. Assistant Secretary of Navy Edison has said he does not think any legislation will be necessary.



Maximum motive power engineered into minimum space—this 1000 horsepower, double-bank, radial motor. Diameter, 4 feet, 6 inches. Width, 3 feet, 2 inches. Weight, 1 pound, 9 ounces per horsepower. Needless to say, tools had to be as modern as the motor. Not surprising then, that all tools, jigs and fixtures were designed and built by Taft-Peirce. The facilities of this, the most famous toolroom in the world, are likewise open to *you*. Write for complete details today.

THE TAFT-PEIRCE MFG. CO.

WOONSOCKET T P RHODE ISLAND

Jessop Steel Adds New Equipment

THE Jessop Steel Co., Washington, Pa., has placed a new 10-ton Heroult electric melting furnace into operation, according to R. Edson Emery, president. In addition, a new thermostatically controlled annealing furnace is nearing completion and will be placed in operation shortly. The addition of these furnaces has been made to meet an increased demand for tool and die steels resulting from general improvement in industrial activity.

Carnegie-Illinois to Run Pencoyd Plant

THE Carnegie - Illinois Steel Corp., effective March 1, will assume control of the Pencoyd plant of the American Bridge Co. near Philadelphia and will operate it as part of its Eastern, or Pittsburgh district. William S. Unger, now assistant general superintendent of the Homestead works, will become general superintendent of the Pencoyd plant. A. H. Wartman, who has been acting manager of Pencoyd since Jan. 1, 1927, will become assistant general superintendent.

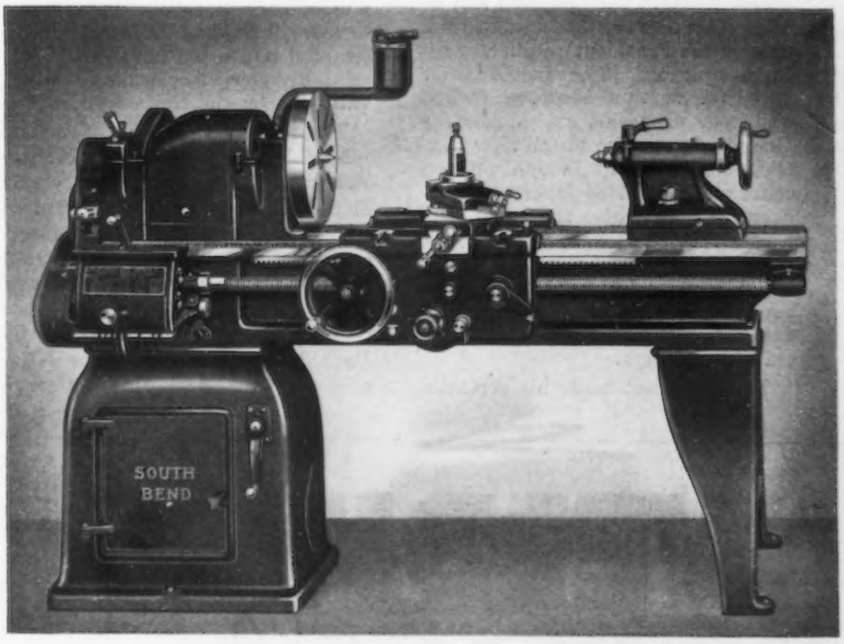
The American Bridge Co. will retain the bridge shop and erection tool house, but the other divisions, consisting of 11 open hearths, a 36-in. blooming mill, a 12-in. bar mill, a 20-in. structural mill, a 23-28-in. structural mill, a large machine shop, and steel, iron and brass foundries, will become Carnegie-Illinois Steel Corp. properties.

Americans Will Visit Foreign Laboratories

AMERICAN industrialists will have an opportunity to observe developments in European steel and metallurgical research this summer during a unique tour of scientific laboratories being arranged by the National Research Council's division of engineering and industrial research. About 100 prominent bankers and industrial men, including leaders in the steel industry, are expected to participate in the tour which will enable them to visit such laboratories as the Brown-Firth laboratories in England, probably the most important alloy steel research laboratory in the industry, the Krupp laboratories, the Siemens laboratory and the Kaiser-Wilhelm Institut, all in Germany.

Research laboratories of 18 major fields of industry will be visited in England, France and Germany, besides those of trade associations, governments, and universities. In addition, accommodations will be made on the request of any member of the tour for special side trips to industrial laboratories not included in the general plans. Foreign hosts will be such organizations as the Department of Scientific and Industrial Research in England, the Verein Deutscher Ingenieure in Germany, the Sorbonne in France, and others.

The group will sail May 14, from New York, on the *S. S. Champlain*, according to present plans. Travel arrangements are being made by the American Express Co.



No. 117-C 16" x 6' Quick Change Gear Underneath Belt Motor Drive Lathe complete as shown, weight 2300 pounds..... $869

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Catalog No. 96 illustrates, describes, and prices the new 1937 Series of South Bend Precision Lathes in all sizes and styles. A valuable book for the shop man, engineer, and plant executive. Sent free, postpaid, upon request.

THE new 1937 Series of South Bend Back-Geared, Screw Cutting Precision Lathes with Double Wall Aprons and hardened and ground headstock spindles are recommended for the finest and most accurate work in the tool room, machine shop, manufacturing plant, and laboratory. Offered in sizes from 9" to 16" swing, in bed lengths from 3' to 12', Underneath Belt Motor Drive, Countershaft Drive, and Pedestal Motor Drive.

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South Bend, Indiana, U. S. A.

SOUTH BEND *Precision* LATHES
MODERN LATHES FOR MODERN INDUSTRY

Labor and Fair Trade Legislation Still in Study Stage, Says President

WASHINGTON, Feb. 23.—The Administration program for wage and hour standards is still in the study stage, President Roosevelt said today. The program also is said to include fair trade practice provisions. The President said it probably will be some time before definite proposals are presented to Congress. It was not stated whether the program will be offered before or after Congress acts on the President's judiciary reform program. The fact that it will be some time before the wage and hour proposals are laid before Congress gave rise to the view that they would await action on the court reorganization program. However, there was also the belief that because of the probable prolongation on the court plan, the labor legislation and trade agreement program will be submitted prior to action by Congress on the judiciary reform program.

The President made his remarks about wage and hour legislation shortly after Speaker of the House Bankhead had announced that the President will sent a special message to Congress on labor relations.

Underlying the purpose of the wage-hour legislation, it has been stated, is enactment into law of the Administration policy for wider distribution of mass purchasing power, with a greater share going to labor, as the Administration attempted under the National Industrial Recovery Act, which was invalidated by the Supreme Court.

The proposed program is said to follow the lines of conferences President Roosevelt held recently at the White House with organized labor leaders and business interests, including President Harper Sibley of the United States Chamber of Commerce. It has as its basis plans which have been urged by Donald R. Richberg, former NRA administrator, and Major George L. Berry's Council for Industrial Progress.

The proposed legislation it is understood will define interstate commerce in an effort to meet with court approval and to set up mandatory wage and labor standards for industries engaged in such commerce, excluding those which are not, such as individual retail operations as distinguished from chain store merchandising. Under the plan it is reported a board, under the Federal Trade Commission, would be set up to establish wage and hour standards for each industry, while another board, perhaps under the Department of Commerce, would set up voluntary trade practice agreements, which, through relaxation of the anti-trust laws, would outlaw unfair and wasteful trade practices. Joint defense by the Government and the affected industries would support the voluntary trade agreements against legal attack.

Child labor and unreasonably long hours and low wages would be prohibited and violations of the standards would be subject to Federal Trade Commission cease and desist orders carrying penalties. Varying labor and wage standards would be provided both as to regions and industries and be determined upon after hearings before the FTC board. The set-up would require further expansion of the FTC with an increase over its present annual appropriation of $1,539,000.

It is said that in connection with the program consideration is being given to modification of the Robinson-Patman Anti-Price Discrimination Act by clarifying definition of trade practices that are prohibited. Complaint has been made that some of the provisions against price discrimination lack clarity and also that penalties for violation are too severe. Particular objection has been made against the penalty of one year in jail for price discrimination and provision for collection by competitors of triple damages for violation of the act. These provisions, it is reported, would be relaxed.

New 13 oz.
WELDIT
MODEL W
WELDING TORCH
with BUILT-IN Automatic GASAVER
SAVES fuel—reduces welding cost—eliminates idle flame hazards. As operator grasps handle of torch placing thumb on lever in natural position, full welding flame is instantly on. Release thumb, and automatically flame is reduced to pilot size. No re-lighting or re-adjusting flame between welds. Weighs only 13 ounces, no mechanism in handle, fuel control valves are conveniently located in front of torch handle. Actual savings will soon pay for torch.
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WELDIT ACETYLENE CO.
641 BAGLEY AVE. DETROIT. MICH.
Test this WELDING TORCH ★ Free ★ FOR TWO WEEKS IN YOUR PLANT

Inclusion of list prices features a new edition of "Grinding Wheel Specifications for Grinding Machines," published by the Norton Co., Worcester, Mass. Specifications for wheels of machines built by more than 60 companies are given, and separate sections are devoted to standard types and shapes of grinding wheels. A wheel telegraph code and an index of machine manufacturers and wheel shapes complete this useful 112-page book.

M.I.T. Offers Special Course in Materials

A SPECIAL summer school course and conferences on strength of materials will be held at the Massachusetts Institute of Technology for four weeks beginning June 21.

The subject of creep will be presented by Dr. A. Nadai, consulting engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh. The last two lectures of this series will be given by C. R. Soderberg, manager of the steam turbine department, Westinghouse Electric & Mfg. Co., in which design applications using plasticity theory will be discussed.

Lectures on fatigue will be presented by Dr. H. J. Gough, superintendent of the engineering department, National Physical Laboratory, England.

Lectures on strength of materials will be given by members of the institute staff. The laboratory exercises in the testing of metals will make use of the more modern measuring instruments and apparatus. Four seminars will be held during the course to afford opportunity for the presentation of recent developments in allied fields of engineering mechanics.

Further particulars may be had by communicating with Prof. John M. Lessells, department of mechanical engineering, Massachusetts Institute of Technology, who is director of this summer course.

Flood Damage Not Fully Ascertained

CINCINNATI, Feb. 23.—Estimates of flood rehabilitation needs expressed in tangible steel requirements in the Cincinnati district are slow in assuming concrete form. It is probable that exact data will never be collected and the tangible costs only ascertainable after inventory has been taken, many months hence. Of course, the greatest and most noticeable destruction is recorded on homes.

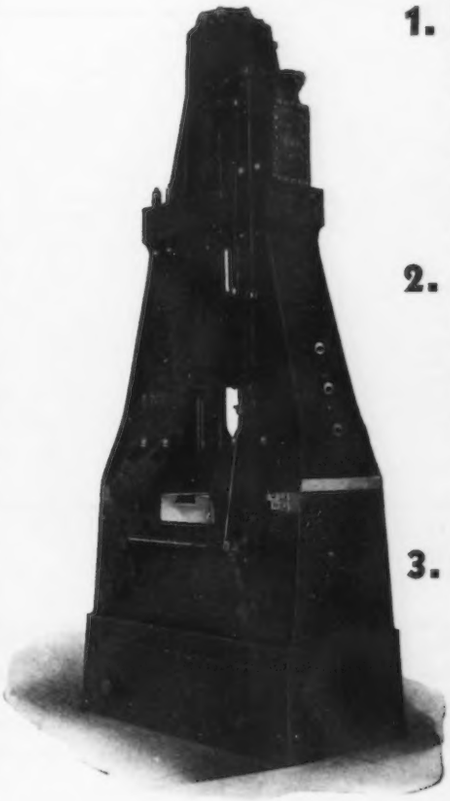
In the area from Portsmouth, Ohio, to Lawrenceburg, Ind., 1000 to 1500 homes were swept away, according to information available. Reconstruction of Portsmouth, Ohio, from the ground up is necessary. Other small towns in the same area will need much reconstruction work. Failure of water and power supply, due to flooding of plants, has turned attention to building of new projects on higher ground so as to be flood proof.

Removal of industrial centers from riverside to hill top is suggested. In fact, the whole gamut of proposed flood protection is discussed. In addition, Government agencies, aided and abetted by local chambers of commerce, business organizations and civic groups are projecting a series of dams and reservoirs to absorb heavy flood waters to prevent a sudden repetition of the 1937 disaster.

In the home builing field, opportunity is beckoning. Here the steel house (and there are plenty needed) can offer a splendid service. One steel plant in the district reports that all of its small wooden buildings were destroyed by the rushing waters, but a steel structure withstood the tremendous punishment and needed only cleaning to be used again. With this background, the steel house has a bright outlook and a market of great proportions.

THIS NEW ERIE STEAM DROP HAMMER

in the crankshaft forge shop of a prominent automobile manufacturer



1. Reduced Steam Consumption

With the same ram, the cylinder bore was reduced from 27″ to 23″. The old hammer was 30% larger in cylinder area but the new hammer is faster, hits harder.

2. Increased Production

The new crankshaft, 14-lb. heavier than the old one, is made with three fewer blows. This is the best possible indication of the new hammer's speed and force, and of the character of its blow.

3. Runs on Lower Pressure

In spite of the smaller cylinder bore, it has been possible to cut down the steam pressure below that previously used. This is important for shops that want to operate their hammers on compressed air, or on low steam pressure.

ERIE FOUNDRY COMPANY, ERIE, PENNA., U. S. A.

DETROIT: 335 CURTIS BUILDING
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ERIE

Step up Sawing Speeds, Feeds and Blade Tension

Don't baby your hack saw machine —get all you can out of it.

MARVEL
High-Speed-Edge
Hack Saw Blades

Strictly High - Speed, these patented combination blades are also *positively unbreakable.* They permit greatly increased running speeds, for heavier feed pressures, and can be tensioned much tighter than other blades because the hardened "eyes" in their tough alloy steel body will not pull out.

No matter what hack saw equipment you use, you can safely run at *full capacity* with MARVEL High-Speed-Edge Blades.

Write for Circular

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
347 N. Francisco Ave.
Chicago **U. S. A.**

Steel Bar Color Code Approved

The proposed simplified practice recommendation of a color code for marking steel bars has been accorded the required degree of acceptance by the industry and is to be promulgated as of April 1, according to an announcement by the Division of Simplified Practice, National Bureau of Standards, Department of Commerce.

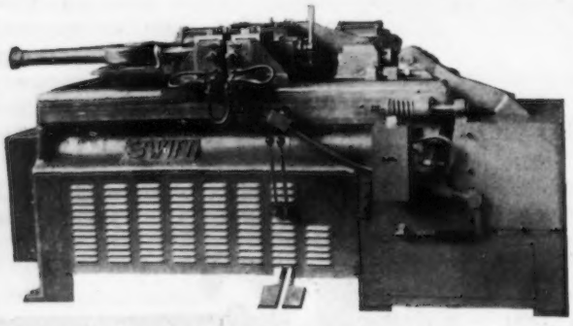
The recommendation will be identified as Simplified Practice Recommendation R166-37.

This recommendation, which was proposed and developed by the National Committee on Iron and Steel of the National Association of Purchasing Agents, is limited to a color code for marking commonly used grades of steel, as represented by S.A.E. numbers.

Until printed copies are available, complimentary mimeographed copies of this Simplified Practice Recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington.

SWIFT *NO. 91-AA 500 KVA* FLASH WELDER

Swift No. 91-AA 500 KVA Flash Welder welding forged flanges 3/16" wall thickness to axle housing 5/32" wall thickness. Actual time welding cycle 2 seconds. Takes up 3/16" variation in length of stock and welds to uniform length. Suitable for high speed production welding on parts up to 2½ square inch section.



SWIFT ELECTRIC WELDER CO., 6560 EPWORTH BLVD., DETROIT

Welding machines which are hand, hydraulic, cam or air operated, including the following types: SPOT, SEAM, PROJECTION, FLASH, FLUE, AND GUN WELDING UNITS . . . . . .

Carnegie-Illinois to Open Mercer Works

REFLECTING a heavy influx of sheet orders, Carnegie-Illinois Steel Corp. will recondition and reopen its Mercer works at Farrell, Pa., within the next few weeks. The plant has not operated for more than two years. The cost of reconditioning will approximate $100,000 and there will be jobs for about 450 men. In selecting the workmen, the company will give preference to former employees.

Four roughing and five finishing mills will be recommissioned and will have a weekly capacity of 1000 tons. Sheets produced will be common hot rolled, annealed and single pickled sheets.

This move on the part of the company has been made necessary because of overflow business at the Vandergrift, Pa., Cambridge, Ohio, and Gary, Ind., sheet mills. Operations of the Mercer sheet works will be under the supervision of C. A. Ferguson, general superintendent of the Farrell tin mill.

Japan to Buy Indian Pig Iron

JAPANESE iron manufacturing concerns are preparing to abandon their dependence on Russia for supplies of pig iron and to import it in the future from India. During 1936 Japan imported 800,000 tons of pig iron from Russia.

The Japanese Ministry of Commerce estimates the Japanese demand for pig iron for 1937 at 3,600,000 metric tons and for steel at 4,650,000 metric tons, an increase of 300,000 metric tons and 500,000 metric tons compared with 1936.

Carnegie-Illinois Hearing Postponed

WASHINGTON, Feb. 23.—Hearings before Examiner Wood of the National Labor Relations Board involving alleged discrimination by the Carnegie-Illinois Steel Corp. against union employees were adjourned last Saturday for two weeks, on call of the board, subject to one week's notice.

Carnegie-Illinois Workers Voting On Proposed New Wage Demands

PITTSBURGH, Feb. 24. — The question of a $5 a day minimum and an 80c. a day rise for other workers, which was recommended recently by the Pittsburgh district council of Carnegie-Illinois employee representatives, is now being considered and voted upon at the company's 18 plants in the Pittsburgh - Youngstown district. Following the ratification by the employee representatives at the various plants, the question will be negotiated with the management. The consistent efforts of the employee representatives to gain a $5 minimum has lead some observers to believe that a settlement between employee representatives and management on this question will be forthcoming in the near future. It is known that some steel managements have discussed the entire wage program previous to negotiating with their employee representatives.

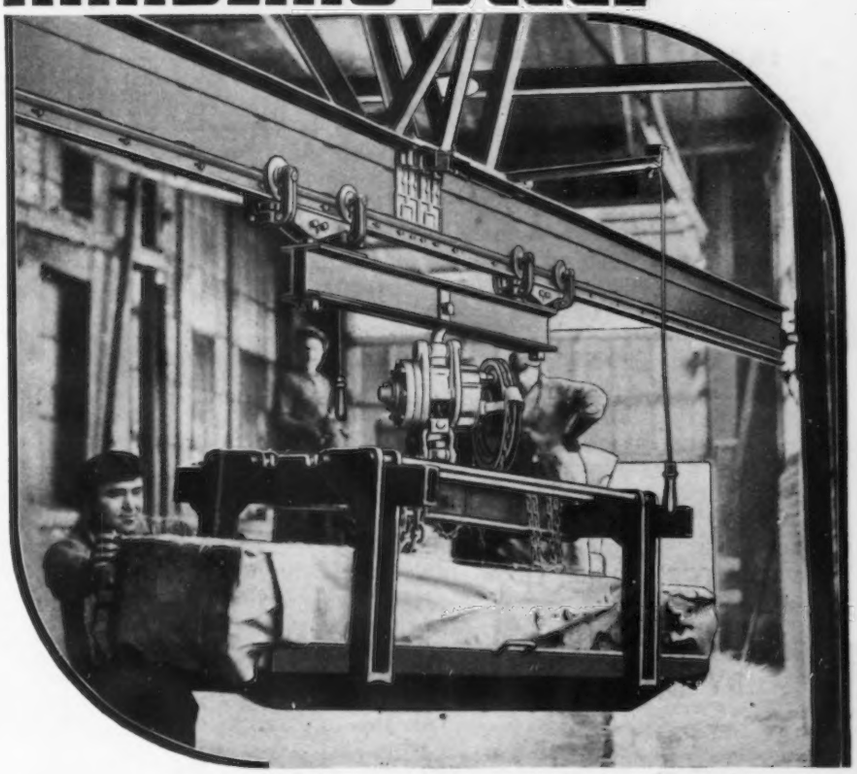
The first tangible results of the Carnegie-Illinois Steel Corp.'s employee representation grievance committee, commonly called "the little supreme court," was the granting to 43 employees in the machine shop of one of the company's plants the full benefit of the pay raise granted to all employees last November. At that time the machine shop employees received only 4.86 per cent increase because they were already the highest paid of any machinists in the 18 plants. As the result of the grievance committee's action, the company accepted its recommendation and granted the full 10 per cent increase, making it retroactive to Jan. 1.

The only other outstanding feature on the labor front in the past week was a walkout of 250 employees of the Braeburn Alloy Steel Corp. steel tool plant at Braeburn, Pa. According to strike leaders, a protest was being made against the discharge of three union employees. However, the company management said the men were dismissed because of reporting for work in an intoxicated condition. The SWOC entered the picture, ordered the plant picketed, and claimed a membership of 90 per cent, while a statement from T. H. McGraw, president, indicated that only 30 employees belonged to the union. Mr. McGraw said that most of the pickets were from surrounding mines and other manufacturing concerns. He forecast "an indefinite shutdown of the plant to prevent violence" after union officials refused to agree to an employee election to be held inside the plant in order to determine the union membership. The election suggestion came from the sheriff of the county who is maintaining order.

Salaried employees, including office and sales force, are starting their annual two weeks' vacation with pay while the plant is closed.

C. R. Burt, president, and Tell Berna, manager, of the National Machine Tool Builders Association, also George A. Fernley, advisory secretary of the Associate Machine Tool Dealers, were guests at a luncheon of the Detroit Area Associated Machine Tool Distributers at the Recess Club on Feb. 9.

HANDLING STEEL



the Easy Way

This toughest of all jobs—handling 3 ton bundles of sheet steel—is made easy with American MonoRail equipment. Here you find little damage to sheets—less danger of accident—lower labor costs. In fact, truck loads of steel are moved from dock to storage in one fourth the time formerly required. American MonoRail engineers, with their specialized experience, are ready to help solve your handling problem. Why not let them look at it without obligating you in any way. Write for the 192 page book "Overhead Material Handling Equipment."

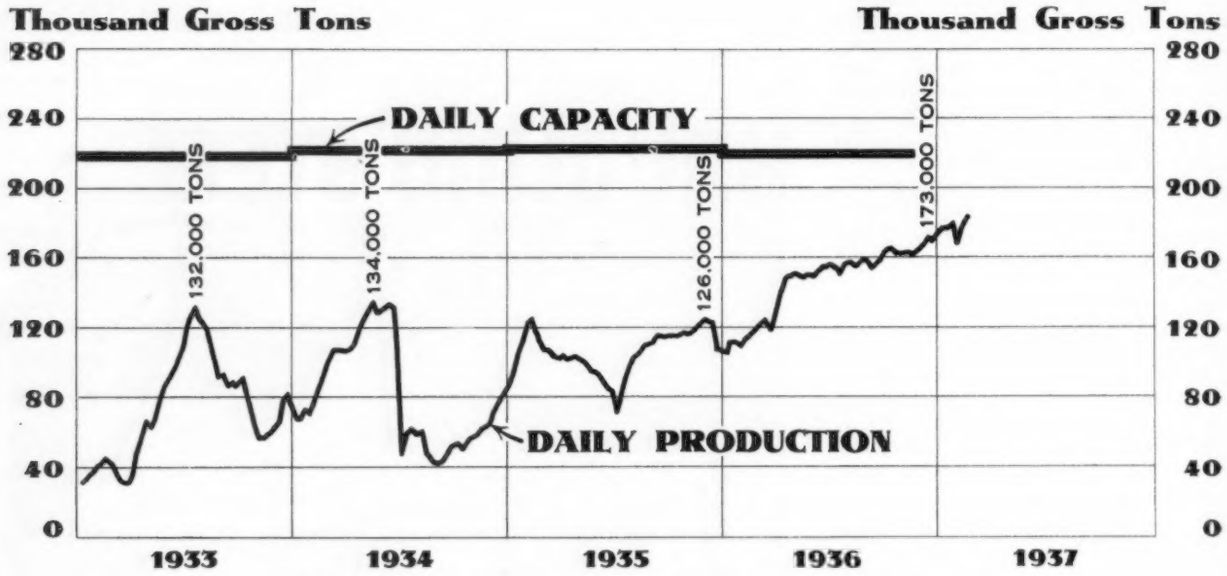
AMERICAN MONORAIL CO.

13103 Athens Ave., Cleveland, O.

STEEL INGOT PRODUCTION

Daily Tonnage of Bessemer and Open-Hearth Steel Ingots Produced by Weeks, 1933-1937

Current Week	Last Week	Weeks Ended Feb. 22, 1936	Feb. 23, 1935	Feb. 24, 1934	Feb. 25, 1933
184,852	183,738	120,710	107,370	103,489	41,168



Figures for the current week are not indicated on the chart until the following week.

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

District	Current Week	Last Week	Weeks Ended Jan. 23, 1937	Feb. 22, 1936	Feb. 23, 1935
Pittsburgh	87.0	85.0	82.0	38.0	39.0
Chicago	80.5	80.5	77.0	60.0	54.0
Valleys	83.0	81.0	77.0	60.0	60.0
Philadelphia	58.0	58.0	56.5	40.0	36.0
Cleveland	80.0	80.0	79.0	66.0	67.0
Buffalo	88.5	86.0	79.0	30.0	46.0
Wheeling	98.0	98.0	94.0	80.0	85.0
Southern	74.5	74.5	77.5	67.0	50.0
Ohio River	45.0	*45.0	96.0	79.0	75.0
Western	91.5	91.5	91.5	45.0	35.0
St. Louis	82.0	81.0	75.0	77.0	37.0
Detroit	93.0	93.0	100.0	100.0	100.0
Eastern	98.0	98.0	95.0	50.0	40.0
Aggregate	83.0	82.5	81.0	53.5	50.5
Average Year to Date	80.0	79.6	80.0	51.3	50.7

* Revised.

Weekly Booking of Construction Steel

FROM THE IRON AGE

	Week Ended Feb. 24, 1937	Feb. 16, 1937	Jan. 26, 1937	Feb. 25, 1936	Year to Date 1937	1936
Fabricated structural steel awards	12,350	39,430	58,500	25,950	217,445	176,715
Fabricated plate awards	870	1,960	3,260	7,650	26,420	63,455
Steel sheet piling awards	2,025	0	0	7,685	12,555	14,045
Reinforcing bar awards	5,200	6,980	1,275	13,735	30,815	86,030
Total Lettings of Construction Steel	20,445	48,370	63,035	55,020	287,235	340,245

. . . . SUMMARY OF THE WEEK. . . .

. . . General advance in steel prices expected momentarily.

o o o

. . . Some wire products advanced; pig iron up $1 a ton.

o o o

. . . Coke and scrap higher; steel output at 83 per cent.

A PRICE advance affecting nearly all steel products and probably ranging from $2 to $6 a ton will be announced by a leading producer within a few days. This may be followed by another wage increase for steel mill labor, the amount depending upon the outcome of negotiations that will soon be in progress. There is also good authority for the prediction that a solution of the controversy between Federal Government authorities and the steel companies over the Walsh-Healey Government Contracts Act may be found shortly.

Price advances have been initiated by producers of wire products and pig iron. Nails and staples have been put up $5 a ton, barbed wire $6, heavy fence wire $4, light fence wire $6 and bale ties $3, effective immediately and without contract privilege. A new classification for wire rods has been adopted whereby the base sizes are No. 5 to 9/32 in. at unchanged prices, but on sizes over 9/32 in. to 47/64 in. an extra of $4 a ton will be charged.

A leading merchant furnace interest announced an advance of $1 a ton on pig iron, effective at once, and other producers in all important districts have taken like action. Other raw materials markets are strong and advancing. Beehive furnace coke is up 25c. a ton at Connellsville to $4.25, and scrap is higher in all markets. The Pittsburgh range on No. 1 heavy melting steel is $20.50 to $21, and leading factors in the scrap trade freely predict a $25 market. Scrap exports are reducing available supplies in the East, more than $20, f. a. s. Atlantic port, having been paid, which is more than Atlantic seaboard mills are offering. Available ships have been so extensively chartered for scrap exports and for water shipments of steel to the Pacific Coast that export of finished steel is delayed. Sweden, not hitherto a buyer of scrap in this market, is seeking supplies here. The Japanese need for scrap is illustrated by the fact that in 1936 Japan imported 800,000 tons of pig iron from Russia, a supply that is now shut off, forcing Japan to buy pig iron and scrap wherever she can obtain them. The demand for finished steel for export is insistent, and in some instances prices above domestic quotations are being paid. On wire rods exporters have obtained a premium of $12 a ton, and on nails $5 to $7.

MEANWHILE, domestic steel business is in such volume that mills find their backlogs at the end of February heavier than they were a month ago. Sheet mills are generally sold up through May, wire producers have 10 to 12 weeks' business on their books, and plates, which have lagged in the general recovery, cannot now be had from leading mills in less than eight weeks.

Recent demand has been stimulated by apprehension of possible mill shortages caused by a coal or steel strike, but at the same time there is heavy consumption and no excessive stocks are being built up. Opinion in the steel industry now leans to the view that there will be no general steel strike this spring. The steel needs of the Navy Department for its building program have been forcibly brought to public attention through the Walsh-Healey Act situation, and it is believed that whatever influence the Federal administration has with John L. Lewis's Committee for Industrial Organization will be exerted on the side of peaceful negotiations. New labor legislation proposed by President Roosevelt, if passed, may have an important bearing on CIO activities.

Steel production is being pushed to the fullest extent that existing facilities, together with supplies of coke and pig iron, will permit. The average for the country is estimated at 83 per cent. The Pittsburgh district is operating at 87 per cent, a gain of two points, a similar increase to 83 per cent has occurred in the Ohio Valleys, with a stepping up also at Buffalo and St. Louis. Tin plate mills are running at virtually full capacity.

The $1 advance in pig iron brings THE IRON AGE pig iron composite price up to $21.25 a gross ton. The scrap composite has risen to $19.92, which is just 33c. a ton under the average pig iron price prior to this week's advance.

. . . PITTSBURGH . . .

. . . Price advance on nearly all steel products expected momentarily.

o o o

. . . Some wire items sharply increased, effective at once.

o o o

. . . Ingot production in Pittsburgh district rises to 87 per cent.

PITTSBURGH, Feb. 24—Interest this week is centered on steel prices and a general advance in quotations is expected momentarily.

New wire prices have been announced and reflect a $5 increase on nails and staples, $6 on barbed wire, $4 on heavy fence, $5 on lawn fence and $6 on light fence. Base prices on bright and spring wire, annealed and galvanized fence wire are unchanged, but size extras amounting to $2 to $4 have been added. The new rod classification shows a base of $43 a ton for No. 5 to 9/32 in., inclusive, with a $4 extra for rods over 9/32 in. to 47/64 in., inclusive.

Advances on other finished steel products will probably run from $3 to $4 a ton. Some semi-finished items may be marked up $2 a ton. No announcement has been made as yet with respect to pipe discounts, but certain tubular products are slated for an increase. There is a possibility that some flat rolled products may be advanced as much as $6. With a Chicago producer having raised the price of all grades of pig iron $1 a ton, effective immediately, it is expected that local producers will adopt this price within a day or two.

Meanwhile, producers are making every effort to gain headway in cutting down tremendous backlogs, with the result that operations in the Pittsburgh district have moved up two points to 87 per cent of capacity. Wheeling district ingot output remains unchanged at 98 per cent. Incoming business is ahead of shipments and delivery promises on hot and cold drawn bars, plates and sheets have been extended. Some sheet promises are running over 16 weeks.

Tin plate specifications are heavy and operations have moved up one point to 98 per cent.

Raw material markets are exceptionally strong, with beehive furnace coke quotations moving up 25c. a ton and No. 1 heavy melting up $1 a ton.

Pig Iron

Higher prices for pig iron are expected momentarily. Many producers are apprehensive about their ability to satisfy demand during the remainder of the year. Some customers, clearly sensing the exceptionally tight situation in the pig iron market which has existed for several months, are endeavoring to get their orders on the books in anticipation of later conditions. Meanwhile, producers still show no willingness to solicit business, inasmuch as they have still been unable to make the desired additions to their inventories.

Semi-Finished Steel

Higher prices for semi-finished steel are imminent and announcements to that effect are expected almost momentarily. Meanwhile, the volume of bookings so far this month is almost twice as great as the same period in January. It has been said repeatedly that a shortage of raw steel exists and events in the past month have only accentuated this condition.

Bolts, Nuts and Rivets

Total orders in the past week have shown an increase due, mainly, to a greater number of specifications from both the automobile industry and miscellaneous sources. As far as production is concerned, bolt and nut makers in this district are operating at virtual capacity and see no let-up for some time to come. They have yet to receive heavy specifications from railroad car builders. In addition to this, there is a distinct possibility of higher prices which will undoubtedly bring about a repetition of the avalanche of orders placed last December.

Bars

Higher prices for hot rolled bars will probably be announced within the coming week. Higher labor costs due to lack of skilled workmen, coupled with advances in raw materials, have been responsible for talk of higher steel prices in the past month. Meanwhile, hot rolled bar specifications have been increasing and this week's bookings are ahead of a week ago. Backlogs have been added to and deliveries on some sizes are running at least six weeks. Some cold finished producers are experiencing difficulty in obtaining hot rolled bar stock. The myraid of sizes and grades now on the order books tends to slow up production to some extent. There is an indication that when price announcements are made they will undoubtedly take effect immediately.

Cold Finished Bars

Increased prices for cold finished bars will accompany the advance in hot rolled products, and it is expected that a last minute rush by consumers to get orders on the books will take place. Practically all suspensions on automotive tonnages have been released with the result that backlogs are easily eight weeks or better, depending on the sizes. Bookings in the past week have moved up sharply and are emanating from widely miscellaneous sources including textile machinery makers, machine tool manufacturers and the general trade.

Reinforcing Bars

Higher prices for concrete reinforcing bars are expected soon. Although new projects are coming in slowly, deliveries to jobbers are running from five to six weeks, owing to production and shipping difficulties at hot mills. With the heavy demand for hot rolled bar products, it is not expected that concrete bar deliveries will show any improvement in the near future. The Concrete Engineering Co., Omaha, Neb., has received an award for 550 tons for a reclamation project at Phoenix, Ariz., and an award of 388 tons for a high

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Feb. 24, 1937	Feb. 16, 1937	Jan. 26, 1937	Feb. 25, 1936
Rails, heavy, at mill	$39.00	$39.00	$39.00	$36.37½
Light rails, Pittsburgh	38.00	38.00	38.00	35.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	29.00
Sheet bars, Pittsburgh	34.00	34.00	34.00	30.00
Slabs, Pittsburgh	34.00	34.00	34.00	29.00
Forging billets, Pittsburgh	40.00	40.00	40.00	35.00
Wire rods, No. 5 to 9/32 in., Pittsburgh	43.00	43.00	43.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.20	2.20	2.20	1.85
Bars, Chicago	2.25	2.25	2.25	1.90
Bars, Cleveland	2.25	2.25	2.25	1.90
Bars, New York	2.55	2.55	2.55	2.20
Plates, Pittsburgh	2.05	2.05	2.05	1.80
Plates, Chicago	2.10	2.10	2.10	1.85
Plates, New York	2.33	2.33	2.33	2.09
Structural shapes, Pittsburgh	2.05	2.05	2.05	1.80
Structural shapes, Chicago	2.10	2.10	2.10	1.85
Structural shapes, New York	2.3025	2.3025	2.3025	2.06¼
Cold-finished bars, Pittsburgh	2.55	2.55	2.55	2.10
Hot-rolled strips, Pittsburgh	2.15	2.15	2.15	1.85
Cold-rolled strips, Pittsburgh	2.85	2.85	2.85	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.80	2.80	2.80	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.90	2.90	2.90	2.50
Sheets, galv., No. 24, P'gh	3.40	3.40	3.40	3.10
Sheets, galv., No 24, Gary	3.50	3.50	3.50	3.20
Hot-rolled sheets, No. 10, Pittsburgh	2.15	2.15	2.15	1.85
Hot-rolled sheets, No. 10, Gary	2.25	2.25	2.25	1.95
Cold-rolled sheets, No. 20, Pittsburgh	3.25	3.25	3.25	2.95
Cold-rolled sheets, No. 20, Gary	3.35	3.35	3.35	3.05
Wire nails, Pittsburgh	**2.50**	2.25	2.25	2.10
Wire nails, Chicago dist. mill	**2.55**	2.30	2.30	2.15
Plain wire, Pittsburgh	2.60	2.60	2.60	2.30
Plain wire, Chicago dist. mill	2.65	2.65	2.65	2.35
Barbed wire, galv., P'gh	**3.05**	2.75	2.75	2.50
Barbed wire, galv., Chicago dist. mill	**3.10**	2.80	2.80	2.55
Tin plate, 100-lb. box, P'gh*	$4.85	$4.85	$4.85	$5.25

* Practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Pig Iron

Per Gross Ton:	Feb. 24, 1937	Feb. 16, 1937	Jan. 26, 1937	Feb. 25, 1936
No. 2 fdy., Philadelphia	**$23.76**	$22.76	$22.76	$21.3132
No. 2, Valley furnace	**22.00**	21.00	21.00	19.50
No. 2, Southern Cin'ti	**21.69**	20.69	20.69	20.2007
No. 2, Birmingham†	**18.38**	17.38	17.38	15.50
No. 2, foundry, Chicago	**22.00**	21.00	21.00	19.50
Basic, del'd eastern Pa.	**23.26**	22.26	22.26	20.8132
Basic, Valley furnace	**21.50**	20.50	20.50	19.00
Malleable, Chicago*	**22.00**	21.00	21.00	19.50
Malleable, Valley	**22.00**	21.00	21.00	19.5¢
L. S. charcoal, Chicago	**27.54**	26.54	26.54	25.2528
Ferromanganese, seab'd, carlots	80.00	80.00	80.00	75.00

† This quotation is subject to a deduction of 38c. a ton for phosphorus content of 70 per cent or higher.

* The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	**$20.75**	$19.75	$19.25	$15.75
Heavy melting steel, Phila.	**18.75**	18.50	18.50	13.75
Heavy melting steel, Ch'go	**20.25**	19.50	18.75	14.75
Carwheels, Chicago	**19.50**	18.75	18.50	14.00
Carwheels, Philadelphia	18.50	18.50	18.50	14.75
No. 1 cast, Pittsburgh	17.75	17.75	17.75	14.25
No. 1 cast, Philadelphia	19.25	19.25	19.25	13.75
No. 1 cast, Ch'go (net ton)	**17.00**	16.00	16.00	13.50
No. 1 RR. wrot., Phila.	**18.75**	17.25	17.25	13.25
No. 1 RR. wrot., Ch'go (net)	**18.50**	16.75	16.75	13.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	**$4.25**	$4.00	$4.00	$3.65
Foundry coke, prompt	4.50	4.50	4.50	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	**15.00**	14.00	13.00	9.25
Lake copper, New York	**15.12½**	14.12½	13.12½	9.37½
Tin (Straits), New York	**54.75**	51.50	50.37½	47.62½
Zinc, East St. Louis	**6.80**	6.40	6.00	4.90
Zinc, New York	**7.15**	6.75	6.35	5.27½
Lead, St. Louis	**6.35**	5.85	5.85	4.35
Lead, New York	**6.50**	6.00	6.00	4.50
Antimony (Asiatic), N. Y.	**16.00**	14.25	14.25	13.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Feb. 24, 1937	2.330c. a Lb.	$21.25 a Gross Ton	$19.92 a Gross Ton
One week ago	2.330c.	20.25	19.25
One month ago	2.330c.	20.25	18.83
One year ago	2.109c.	18.84	14.75
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1937	2.330c., Dec. 28	2.084c., Mar. 10	$21.25, Feb. 24	$20.25, Feb. 16	$19.92, Feb. 24	$17.92, Jan. 4
1936	2.130c., Oct. 1	2.124c., Jan. 8	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.199c., April 24	2.008c., Jan. 2	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.015c., Oct. 3	1.867c., April 18	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.977c., Oct. 4	1.926c., Feb. 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	2.037c., Jan. 13	1.945c., Dec. 29	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.273c., Jan. 7	2.018c., Dec. 9	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.317c., April 2	2.273c., Oct. 29	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.286c., Dec. 11	2.217c., July 17	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.402c., Jan. 4	2.212c., Nov. 1	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927			19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

school at Norristown, Pa. Considerable local attention is being given to a large program of public construction for the State of Pennsylvania which will run close to $60,000,000 and will involve additions and renovations of State educational, hospital and mental institutions.

Steel Sheet Piling

Inquiries in the past week have been slow and about the only award made involved 390 tons for the Fort Peck, Mont., dam project, which went to Bethlehem Steel Corp. With higher prices slated for structural projects, advance quotations are likely for steel sheet piling.

Plates and Shapes

Higher prices are expected momentarily for plates and shapes, and there is a distinct possibility that the increased quotations will be effective upon announcement. Structural bookings have shown a marked improvement and total volume of bookings placed since the first of the month are ahead of the same period last month. The leading producer has announced quantity extras on plates. These extras are applicable to the total theoretical weight of a definitely detailed order placed at one time for shipment to one destination. Detailed orders involving 6000 lb. to 4000 lb., inclusive, take 25c. a 100 lb. extra; 4000 to 2000 lb. inclusive, 75c. a 100 lb. extra; under 2000 lb., $1.25 a 100 lb. extra. Revisions have been also made in thickness extras.

Railroad Business

About the only inquiry of any consequence in the past week was 80 milk cars for the Erie Railroad awarded to Greenville Steel Car Co. There are still some car awards to be placed yet, but it is understood that car builders are so busy that physical production problems have delayed the details. Considerable interest is being evinced over the near future possibility of further car repair and car purchase programs.

Strip

Higher prices for strip steel are expected to be announced momentarily. Meanwhile, miscellaneous demand has shown more activity and releases from automobile companies and parts makers have increased. Mill backlogs continue to run as long as five weeks and there is pressure from some quarters for better delivery. Spring building activity and the seasonal trend in the jobbing trade will soon be augmenting the present steady flow of specifications.

Tubular Products

Aggregate orders have shown no falling off, but on the contrary continue to increase. Higher pipe prices, especially for small butt and lapweld grades, are expected to materialize in the near future. Although the opinion seems to be that no increase will take place in oil country goods, there may be an adjustment upward on line pipe. Meanwhile, consumption of standard pipe is mounting and there is little chance of a falling off owing to the sharp increase in home building. Increased consumption of crude oil is causing oil operators to have their hands full in mapping out drilling programs, and as a consequence the steady specifying of casing pipe is one of the outstanding supports of the pipe market.

Wire Products

New wire prices, effective immediately, subject to change without notice and without contract privilege, have been announced. Rod classification shows No. 5 to 9/32 in., inclusave, at $43 a ton. This price was previously the base on wire rods No. 5 to 15/32 in., inclusive. A $4 a ton extra is being charged for wire rods over 9/32 in. to 47/64 in., inclusive. The base price on bright and spring wire is unchanged, but size extras amounting to $2 to $4 a ton have been added. Nails and staples are up $5 a ton, barbed wire up $6, heavy fence wire up $4, light fence up $6 and bale ties up $3. Base prices on annealed and galvanized fence wire are unchanged, but these items are subject to size extras.

Meanwhile heavy releases are being received by producers who are from 10 to 12 weeks behind on deliveries for some items. Production is being maintained at a high level and, with mill books fairly heavy, mills are not going out of their way to solicit new business. The exceptionally consistent demand from foreign countries has brought as high as $12 above domestic quotations for wire rods and $5 to $7 for wire nails.

Sheets

Higher sheet quotations are imminent and will probably be announced within a week. Higher operating costs on account of the wide diversification of sizes, shapes and grades, coupled with increased raw material quotations, have resulted in consideration of price advances. Aggregate sheet specifications so far this month are running far ahead of the volume booked in the same January period. Incoming business is ahead of shipments and backlogs have reached a point almost unsurpassed in the sheet industry. Practically all bookings placed at this time are for second quarter delivery at the prices in effect at that time. Releases from automobile companies and car builders are of such magnitude that, coupled with pressure from miscellaneous consumers, mill managements are facing exceptionally difficult production problems. In support of this contention, is the reopening by the leading interest of a hand sheet mill which has been closed for over two years.

Tin Plate

Tin plate specifications have been received in excellent volume within the past week, and, while the largest portion of the orders represented packers' can specifications, no falling off in general line can business has materialized. Mills continue to have a comfortable backlog and operations are up one point to 98 per cent. While a few plants are not operating at this figure, others are maintaining production above theoretical capacity.

Coal and Coke

Beehive furnace coke has moved up 25c. a ton, making the range now quotable at $4.25 to $4.35, f.o.b. Connellsville prompt. Consumers are attempting to stock as much coke as possible in anticipation of labor disturbances, but are not meeting with much success, as all available coke supplies are needed for current consumption. Coal production is gaining by leaps and bounds as consumers attempt to lay in supplies. With coal operators and United Mine officials deadlocked in New York, the possible outcome is unpredictable, and the possibility of the passage of the Guffey-Vinson Act increases the complexity of the situation. While the bill's purpose is to stabilize the price of coal on the assumption that coal operators will be able to pay higher wages, no attention has apparently been given to the question of possible substitutions in case the price of coal should go too high.

Semet-Solvay Engineering Corp., New York, is fabricating and installing a new blast furnace gas and cold blast pipe system in the Ecorse plant of the Great Lakes Steel Corp., Hanna Furnace Division. Pipe and fittings of various dimensions up to 60 in. are being furnished.

. . . . CHICAGO . . . .

. . . Nearly all steel products to be advanced for second quarter.

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. . . Pig iron prices raised $1 a ton, effective immediately.

o o o

. . . Consumer demand is insistent and adds to mill backlogs.

CHICAGO, Feb. 24.—Mills are holding ingot production at 80½ per cent of capacity at a time when backlogs are creeping up, thus indicating again that raw steel supply is the limiting factor and that consumers cannot hope for improvement in deliveries. In fact, it can reasonably be expected that promises of shipments will be pushed farther into the future.

Users are also faced with the problem of prices for the second quarter. A few weeks ago it was believed that only those products which call for the use of nonferrous metals, would be advanced, but today consideration is being given to advances on most, if not all, finished steel products. Pig iron is being marked up $1 a ton for delivery during the remainder of this quarter, and scrap quotations climb with each new sale, and strength prevails throughout the entire list.

Consumer demand for all iron and steel commodities is insistent and in some quarters, such as in the wire market, backlogs of mill orders are growing and the spring trade is giving only the first signs of life.

Railroad equipment purchases are putting the plate market in its strongest position in five or six years, and structural releases have reached a new 1937 high. Sheet mill books are all but closed for anything desired before May 1. All major industries, and for that matter the minor ones, are hammering at all sources of supplies for their immediate needs and enough extra to assure uninterrupted production schedules.

Pig Iron

Prices are being marked up $1 a ton, effective Feb. 23. For deliveries during the remainder of the first quarter, No. 2 foundry iron is now quotable at Chicago at $22 a ton. Foundries are very busy and February shipments show a 30 per cent gain over the total in January. Four of five merchant stacks in the immediate Chicago area are in blast. If the unit at Duluth is considered, the count stands at five lighted furnaces out of six. Furnace stocks are low and out of balance.

Reinforcing Bars

The outstanding feature of this market is not the matter of current awards but of the amount of work on architects' and engineers' boards. Much of this will break in the spring and therefore the problem of sellers during the next month or two is to stabilize prices, which at this time show wide variation. Outstanding in Chicago is an award for 500 tons for the Outer Drive. At Omaha, Neb., Armour & Co. will use 850 tons for plant expansion. The mill delivery situation, though not good, is not troublesome because most warehouses have large stocks, which, having been taken in before mill prices were advanced, no doubt contribute to weakness in reinforcing bar resale prices.

Cast Iron Pipe

Life is being added to this market by tonnages inquired for by Chicago, St. Paul, and Sisseton, S. D. These appear to be the first offerings in the spring buying season. Sellers eyes are on the trend of spending of Government money. The question is will less be spent on water works and more on flood control during the current year. Prices are steady at $50, delivered Chicago, for 6-in. and larger diameters.

Bars

New orders are heavier and shipments are growing as consumers make every effort possible to take out full commitments before the expiration of first quarter prices. Buyers have two ideas in mind, one being to meet current heavy production and the other to accumulate steel against a possible advance in prices for the second quarter. Shipments of bars are being taken faster by automobile companies, parts makers, forgers, railroad car builders and the farm implement group. Deliveries average 30 days.

Plates

This commodity has finally caught the spirit of the general steel market, bookings being large and shipments heavy. Much of the tonnage is moving for railroad equipment use, but miscellaneous consumers are also more active. About 2000 tons will be required for control gates in Arizona, and other water control works throughout the country bring new tonnages in sight. There is new business coming from the railroads. The Chicago & North Western has ordered eight passenger train locomotives and the St. Louis Southwestern has placed 10 passenger coaches. The elevated lines in Chicago will buy two articulated, streamlined trains.

Rails

Output has been pushed up to 70 per cent of capacity, and still the desires of the railroads are not being met in full. Accessory production has been expanded to match rail shipments and higher output can be expected in the very near future. Some new rail and accessory business is developing in those areas which have recently been damaged by floods.

Structural Material

Mills report an excellent flow of shapes, but shops are complaining that the recent bulge in their bookings did not reach the peak of six months ago and they are somewhat apprehensive concerning the immediate future. Some orders are now developing from areas that were flooded a few weeks ago. These are taking the shape of steel piling and other materials that usually go into bridge construction. A Missouri River bridge is taking over 1500

tons of steel, and other large bridge projects are under way.

Wire Products

Despite output of 80 to 85 per cent of capacity, the full requirements of consumers are not being met and mill backlogs are growing. Activity is expanding rapidly among Southern jobbers, and business is now coming from recently flooded areas. Water damaged stocks are being carefully examined and it appears that much of the tonnage will have to be replaced. The size of users' stocks is in doubt. Accumulations are known to be under way and yet the character of releases indicates a very high rate of consumption. The greatest pressure is for wire sizes drawn on 16-in. blocks, and such deliveries have been pushed back to the range from three to four weeks. Promises on the coarser sizes average two weeks.

Sheets

Most books are now filled up to May and still the rush continues. The use of sheets in farm areas is expanding and farm machinery builders are close to a record in their requirements. Barrel, stove and refrigerator makers are also unusually busy.

The Burlington has ordered six lightweight stainless steel passenger coaches from E. G. Budd Mfg. Co.

Chicago & North Western has ordered eight passenger locomotives from American Locomotive Co.

Chicago Rapid Transit Co. will purchase two articulated, streamlined trains.

St. Louis Southwestern has placed 10 passenger cars with Pullman-Standard Car Mfg. Co.

Canadian Pacific is inquiring for 20 additional locomotives, which probably will be placed in the United States.

Pickands, Mather & Co. have ordered one 0-8-0 switching locomotive from Baldwin Locomotive Works.

Egin, Joliet & Eastern has ordered six diesel electric locomotives from Electro-Motive Corp.

Michigan Limestone Co. has ordered two Alco diesel switching locomotives of 600-hp. each from American Locomotive Co.

Santa Barbara-Vigia, Venezuela, has ordered one 2-4-4 type tank locomotive from Baldwin Locomotive Works. Felipe Sintjago, Santa Barbara, is mechanical engineer.

St. Louis Southwestern has been authorized to purchase five locomotives of 4-8-4 type and 10 air conditioned cars.

Lehigh Valley will build 20 caboose cars in its own shops.

American Car & Foundry Motors Co. is in receipt of the following orders for motor coaches: Pacific Gas & Electric Co., San Francisco, three; Worcester Street Railway Co., Worcester, Mass., 10; New Orleans Public Service Co., New Orleans, 10; Sacramento Northern Railroad, Sacramento, Cal., one.

...Pig iron market is quiet but strong.

o o o

...Foundries see a good deal of business ahead.

BOSTON, Feb. 24.—The pig iron market is quiet, but very strong. Foundries are making inquiries regarding tonnages, but furnace representatives are not committing themselves. The New England melt is holding up well, although it is, perhaps, not quite as heavy as in December. However, there is every prospect that it will pick up again next month, and some of the largest melters have enough tentative business in view to keep them well occupied for some time. Demand for special machinery has tapered off somewhat, but manufacturers, almost without exception, have sufficient business booked to keep them going full the remainder of 1937.

Warehouses have raised galvanized steel sheets from 4.55c. a lb., base, to 4.80c.

...Activity in small construction projects.

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...Unsettled labor situation holds back some plans.

SAN FRANCISCO, Feb. 23.—Numerous small construction projects kept the Pacific Coast steel market active last week. Structural steel awards totaled 1543 tons, of which the Pacific Northwest accounted for 1250 tons. Reinforcing bar lettings aggregated 1670 tons, with Bethlehem Steel Co. taking 445 tons called for in an Alameda Street bridge in Los Angeles and 132 tons in a multiple span bridge at Aberdeen, Wash.

The California Institute of Technology at Pasadena will open bids March 4 on approximately 700 tons of bars and 300 tons of shapes. Four buildings will be built at a total estimated expense of $1,000,000. At Los Angeles, the Department of Water and Power will open bids March 18 on 519 tons of bars for Gene Wash and Copper Basin dams and last week opened bids on 275 tons for an Eagle Rock Canyon crossing.

Damaged perhaps more seriously during the last month of the maritime strike than any other metal trade on the Coast, the cast iron pipe market shows a marked improvement. Bids on four projects, totaling 1232 tons, were opened last week.

Prospective builders are still hesitant to announce their plans with the labor situation still threatening. Although San Francisco and Seattle ports are operating, the Los Angeles harbor is now tied up by picketing teamsters. There is much discussion as to the duration of peaceful maritime relations, but a majority seems to believe that amicable conditions will last for at least a year.

New Flexible Finish for Metal Products

A NEW flexible finish for high-grade metal products subjected to extremely hard usage, such as golf sticks and fishing rods, has been developed by Mass & Waldstein, makers of industrial finishes, Newark, N. J. In gloss and wearing qualities, the new finish, which is known as Duflex, closely resembles the finish produced by extruding or cementing celluloid upon a metal base, according to the manufacturer. The cost, however, is lower.

In finishing a product, such as the metal shaft for a golf club, by the Duflex process, the product is first covered with a primer coat of synpex enamel, which air-dries rapidly and does not require baking before graining. The grain is then applied in the usual manner (if wanted), and both coats are baked. After baking, the product is given five dip-coats of clear Duflex lacquer. The resulting finish has a deep gloss and is very flexible and durable. Any metal can be finished by this process.

Union Metal Products Co., Hammond, Ind., is planning a plant addition to cost $400,000. Austin Co. is the general contractor.

. . PHILADELPHIA . .

. . . Some sellers look for a general price advance.

o o o

. . . Several mills have withdrawn present prices for the remainder of the quarter.

o o o

. . . Operations are unchanged at 58 per cent of capacity.

PHILADELPHIA, Feb. 23.—A widespread demand from both domestic and foreign sources is maintaining operations at the rate established last week, lengthening backlogs, creating additional and worse shipping snarls, and thrusting the question of what to do about prices into the limelight.

A few weeks ago only nails and pipe were forecast for price increases, but today higher costs and the constant threat of serious labor difficulties, as well as the heavy demand, is, in the opinion of some sellers here, calling for a general price advance. Stating that they are just now beginning to feel the effects of the last rise in prices, due to the heavy protective buying in December, producers are anxious to end such periods, and desire to institute a system whereby they may derive an immediate benefit from any boost in quotations. Pig iron is already slated for an increase of $1 per ton this week, and, with foreign agents offering premiums for finished steel for export, it is expected that a price announcement will be forthcoming before the end of the month.

Pig Iron

Eastern Pennsylvania producers are now taking business at $1 per ton higher for the remainder of the quarter, with the prospect of a further increase at the end of the period likely. Foreign inquiries are still prominent, but no sales have been reported in the past week. It has been heard, but not confirmed, that none of the recent tonnage sold for shipment to Japan commanded as much as the domestic price. With at least two furnaces in this district anxious to start blast, but unable to do so for lack of ore, an important mill said to be buying ore wherever obtainable to keep its furnaces in operation, a scarcity of bottoms, and ocean freight rates that have jumped as much as 100 and 150 per cent in the past few weeks, makers are watching ore developments more closely every day, as this basic material tends to assume a relatively more important status than at any time in years.

Plates and Sheets

Local mills are able to provide plates in from two to four weeks and sheets in from four to six weeks. Delivery to this district from mills outside the area on account of orders taken through Philadelphia sales offices are about the same as locally on plates, but for sheets extend well into second quarter and as far ahead as 18 and 19 weeks for some grades. Most of the mills dealing with these products in this territory have withdrawn their prices for first quarter and are now quoting for first quarter delivery only on rare occasions. Foreign interest is unabated, and a price increase is coming to be regarded as almost inevitable, ranging in one estimate from $2 per ton for hot rolled grades to $5 per ton for galvanized sheets. New extras for hot rolled carbon steel plates were announced effective Feb. 15 by the Carnegie-Illinois Steel Corp.

Shapes, Bars and Piling

Only a few relatively small awards have been announced this week. Bethlehem and Phoenix split 385 tons of shapes for work at the Pennsylvania Railroad's Thirtieth Street Station in Philadelphia, while part of the Harrisburg electrification program requiring 100 tons of shapes went to Belmont Iron Works. An addition to the plant of E. G. Budd Mfg. Co., requiring 250 tons of shapes went to Belmont also. In Norristown, Pa., a high school requiring about 330 tons was awarded to Lehigh Structural Steel Co. On March 5 highway work requiring 600 tons of shapes in 10 counties will be open for bids. More highway work will be out for bids March 8 in Trenton when the New Jersey highway department opens on 272 tons in Atlantic County and 330 tons in Middlesex County. Bids are to be taken March 8 on the foundation of a Philadelphia school at 67th and Elmwood, which is to consume some 1000 tons of bars before completion. Structural tonnage is unstated. Bethlehem was awarded 700 tons of piling, Carnegie-Illinois, 250 tons, and Phoenix, 150 tons of H-piles, for construction of the bridge alteration over the Chesapeake & Delaware canal, mentioned last week in structural lists.

Imports

The following iron and steel imports were received here during the past week: 511 tons of pig iron from the Netherlands; 1209 tons of pig iron from British India; 300 tons of ferromanganese from Czechoslovakia; 3247 tons of chrome ore from Cuba; 4017 tons of chrome ore from South Africa; 23 tons of wire rods, 48 tons of steel tubes, 49 tons of steel billets, 45 tons of steel forgings and 112 tons of steel bars from Sweden; and 280 tons of steel bars, 116 tons of steel bands, 15 tons of steel sheets and 457 tons of structural shapes from Belgium.

. . CAST IRON PIPE . .

Wadsworth, Ohio, plans pipe lines for water system; also elevated steel tank and tower, and other waterworks installation. Cost about $43,000. Barstow & LeFeber, 31 North Summit Street, Akron, Ohio, are consulting engineers.

St. Joe, Ind., plans pipe lines for water system; also elevated steel tank and tower, and other waterworks equipment. Cost about $42,500. Lennox & Matthews, Architects' and Builders' Building, Indianapolis, are consulting engineers.

St. Marys, Mo., will take bids soon for pipe lines for water system; also for pumping machinery and auxiliaries, and equipment for iron-removal plant. Russell & Axon, 4803 Delmar Boulevard, St. Louis, are consulting engineers.

Needles, Cal., plans 4 and 10-in. for main water system. Cost about $18,500. O. A. Cox is water superintendent.

Washington Gas & Electric Co., Tacoma, Wash., plans 14-in. for main water line

from pumping station to storage reservoir at Longview, Wash.; also installation of deep-well pumping machinery and auxiliary equipment. Entire project will cost about $50,000.

Lake Villa, Ill., plans pipe lines for water system and other waterworks installation, including elevated steel tank and tower. Cost about $40,000. James Anderson Co., 290 East Deerpath Avenue Lake Forest, Ill., is consulting engineer.

West Farmington, Ohio, plans pipe lines for water system and other waterworks installation. Financing is being arranged through Federal aid. Wight-O'Rourke Co., Guarantee Title Building, Cleveland, is consulting engineer.

Jackson County Public Water District No. 1, care of John N. Maddin, 1201 Bryant Building, Kansas City, Mo., attorney and representative, closes bids March 6 for pipe for water system near Grandview, Mo., totaling about 33 sq. miles of territory, including trunk line connection with main line at Kansas City; also for 250,000-gal. elevated steel tank and tower and other waterworks installation. Cost about $325,000. Charles A. Haskins & Co., Finance Building, Kansas City, Mo., are consulting engineers.

New Houlka, Miss., closes bids March 1 for pipe for water system and other waterworks installation. R. M. Stringer, Tupelo, Miss., is consulting engineer.

Board of Trustees, Burton Township, Genesee County, Mich., plans pipe lines for water system and other waterworks installation. Cost about $150,000. Ora Gould, Flint, Mich., is consulting engineer.

Cyril, Okla., will take bids soon for about three miles of 8-in. for main water line and about 20,000 ft. of 4-in. for distribution lines; also for valves, fittings and other waterworks installation. Cost about $37,400. R. C. Bradley & Co., Chickasha, Okla., are consulting engineers.

Seneca, Kan., plans pipe lines for water system and other waterworks installation. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

St. Paul, Minn., has awarded 500 tons to United States Pipe & Foundry Co.

San Bernardino, Cal., has awarded 100 tons of 4 and 6-in. to an unnamed bidder.

Lake Ore Shipments 58 Per Cent Higher

TOTAL shipments of Lake Superior ore by rail and water in 1936 were 45,203,672 gross tons, as shown by the annual report of the Lake Superior Iron Ore Association. The total amount of ore beneficiated in 1936 was 17,792,457 tons, compared with 10,140,782 tons during the previous year. Ore that was concentrated amounted to 7,716,923 tons, against 5,011,605 tons in 1935. Washing appeared to have gained favor as a method of beneficiation, as 6,693,102 tons were washed as against 3,621,524 tons the previous year. The amount of ore jigged declined to 424,556 tons from 838,212 tons the previous year. Nearly twice as much ore was crushed and/or screened last year as compared with the previous year, the amount being 10,075,534 tons, compared with 5,129,177 tons in 1935.

There were 135 mines in operation last year, a gain of 10 over the previous year. Ore was shipped from 63 Mesabi district mines, a gain of eight; from 23 Menominee district mines, a loss of one; from 11 Cuyuna range mines, a gain of three; from 19 Marquette district mines, the same as last year; from 15 Gogebic range mines, a gain of one and from four Vermilion range mines, the same number that were operated the previous year.

Shipments of Lake Superior Iron Ore by Ranges
(Gross Tons)

Range	To Upper Lake Ports	All Rail	Total 1936	Total 1935
Mesabi	31,203,847	208,004	31,411,851	18,877,537
Marquette	4,514,210	113,679	4,627,889	3,265,537
Gogebic	4,623,512	6,829	4,630,341	3,070,825
Menominee	2,163,293	386	2,163,679	1,534,022
Vermilion	1,029,725	34,748	1,064,473	857,099
Cuyuna	1,293,318	12,121	1,305,439	798,481
Grand Total	44,827,905	375,767*	45,203,672	28,503,501

*Includes 636 tons lost in transit.

Shipments of Beneficiated Ore in 1936 by Methods

Method of Beneficiation	Minnesota	Michigan and Wisconsin	Total
Washed	6,693,102	.....	6,693,102
Jigged	424,556	.....	424,556
Magnetic	17,468	.....	17,468
Sintered	316,400	.....	316,400
Dried	265,397	.....	265,397
Total concentrates	7,716,923	.....	7,716,923
Crushed and/or screened	6,466,934	3,608,600	10,075,534
Total beneficiated	14,183,857	3,608,600	17,792,457

The Hull Rust mine, a United States Steel Corp. property in the Mesabi district, which established a record of producing over 5,000,000 tons of ore in one season a few years ago, led the list of mines in production last year, shipping 4,112,530 tons. Second place was held by the Mahoning mine, a Mesabi range property operated by Pickands, Mather & Co., which shipped 2,521,824 tons.

. . . Demand for sheets in excess of capacity.

o o o

. . . Some steel plants still idle because of flood.

CINCINNATI, Feb. 23.—Sheet demand is in excess of mill capacities. All plants, except Portsmouth and those in northern Kentucky, are now in operation. The plants of Newport Rolling Mill Co. and Andrews Steel Co. are being rapidly rehabilitated from high water damage and return to full operation is a matter of only a short time. The Portsmouth plant of Wheeling Steel Corp. is pressing flood clean-up and rehabilitation so that operations may be under way shortly.

The leading district interest is out of the market for first quarter, but orders for the next quarter at then prevailing prices are rapidly filling order books. Users are seeking early position to be assured of steady sheet supply.

Steel ingot production for this district is up a few points to above 40 per cent. Two interests have not yet fired any furnaces, while the others now in operation bring the total to 13 open hearths out of 34.

As foundries recover from flood damage, pig iron shipments slowly expand. Flood damage to patterns is still retarding castings production, but the trade is marshaling forces to clear the situation promptly.

Coke deliveries are lagging as foundries specify heavily, probably in a desire to build up stocks in case of a coal strike. Prices are steady.

Warehouses have been restored to almost pre-flood conditions and stocks reclaimed. Business is active, with some indication of flood reconstruction demand developing.

. . . CLEVELAND . . .

. . . Youngstown production stepped up to 83 per cent of capacity.

o o o

. . . Ford Motor Co. issues first open inquiry for iron ore for 1937 season.

o o o

. . . Steel price advances ranging from $2 to $8 a ton are expected.

CLEVELAND, Feb. 23.—With heavy releases from General Motors and other automobile plants and substantial backlogs of nearly all products, Youngstown district mills stepped up operation two points this week to 83 per cent of capacity. The Cleveland-Lorain rate is unchanged at 80 per cent of capacity.

Finishing mills are being crowded to produce by April 1 as much as possible of the tonnage placed for the first quarter. Mills can take very little steel in any form for shipment during March, and considerable tonnage, principally in sheets and strip steel, has been entered for the second quarter subject to prices prevailing at the time of shipment. There is considerable pressure for deliveries, but producers usually are able to take care of the urgent needs of customers.

February will end with about the same volume of new business in finished steel as January. Miscellaneous demand continues good. Business from railroads is slack and new building activity is light.

The Ford Motor Co. inquired this week for 315,000 tons of ore for 1937 delivery, this company being the first, as it usually has been for several years, to send out an open market inquiry. This inquiry diverts attention to the ore situation, which is of more than ordinary interest this year because of the expected increase in the consumption, the world scarcity of pig iron, scrap and steel and the demand for these products for export. Sellers find justification for higher ore prices in the increased mining costs that have resulted from the last wage advance. However, the season's prices have not yet been named. Ore firms already have received heavy commitments from steel companies with which they are either affiliated or have long term contracts and one of the largest Cleveland ore companies already has disposed of practically all the ore that it will ship this season. The Ford inquiry is for 10,000 tons of open-hearth, 60,000 tons of high phosphorus, 45,000 tons of low phosphorus and 200,000 tons of basic ore. The Ford inquiry last year was for 490,000 tons.

Steel prices for the second quarter are expected to be announced in a day or two and are causing an increased amount of discussion with varying opinions of advances from $2 a ton on some products up to as high as $6 or $8 a ton on coated sheets. Consumers are now showing anxiety to have prices announced.

Pig Iron

Prices have been advanced $1 a ton, effective immediately, on all grades for the remainder of the quarter. The advances apply to Cleveland, Youngstown, Buffalo, Erie, Toledo, Chicago and Birmingham. While the announcement of the advances does not cover second quarter prices, it is expected that these advanced prices will apply to the second quarter when books are opened next Monday.

Shipments continue heavy and it is estimated that they will show a gain of 15 to 20 per cent this month over January. Producers expect to have about all the iron now on their books shipped by April 1. Higher prices are expected to bring a heavy buying movement in March. Japan is reported to be scouring the Central West for additional iron and other foreign inquiries have come out, but interior furnaces are not interested in export business. Interlake Iron Corp. on Monday blew in its second Chicago furnace, and is now operating all of its six furnaces for the first time since 1930.

Sheets

New business continues heavy and practically all the orders are for second quarter shipment, as mills can take on no additional business for March delivery. Some mills have further extended their delivery dates, but others report slight reductions in their backlogs. Some delivery promises are set as far ahead as 18 weeks. Most of the steel suspended by the General Motors Corp. plants has been released and some new purchases were made during the week by units of this company, including the local Fisher Body plant. All orders are being taken subject to prices prevailing at time of shipment. Damage to stocks of sheets during the recent flood is bringing out replacement business from fabricators in the Ohio River valley. While many buyers are not in early need of sheets, they feel that if they place orders now they will be able to secure shipments when wanted.

Iron Ore

Consumption of Lake Superior ore during January amounted to 4,694,312 tons, a gain of 142,933 tons over December. This compares with 2,951,568 tons melted in January last year. Furnace stocks on Feb. 1 were 22,985,780 tons and the amount at furnaces and on Lake Erie docks on that date was 26,747,006 tons or 1,657,329 tons less than on the same date a year ago. There were 141 furnaces in blast Jan. 31, a decrease of one for the month. The total number of furnaces represented in the compilation of monthly consumption figures by the Lake Superior Ore Association has been reduced to 192 by the dismantling of three furnaces, two of the American Rolling Mill Co. at Columbus, Ohio, and one furnace of the Youngstown Sheet & Tube Co., at Hubbard.

Strip Steel

All the strip tonnage held up by the General Motors parts plants during the strike and also much of the hot strip that was suspended by nonintegrated cold rolling plants has been released. With these releases rolling schedules are filled for March and the only business that is being taken is for

the second quarter subject to prices prevailing at the time of shipment. Some of the mills have extended delivery dates on hot strip to six to eight weeks.

Bars, Plates and Shapes

New demand for bars is active both from the automotive industry and miscellaneous consumers. Specifications have increased from forge shops making automobile parts. Some mills are still able to sell certain sizes for March shipment. In case rolling schedules are filled for March, orders are being entered for later delivery, subject to the then prevailing prices. Specifications are good for structural shapes and mills have heavy backlogs. However, new inquiry for fabricated work is light. The only sizable inquiry of the week was for 400 tons for a State highway bridge. Plate mills have good backlogs.

. . . Foundries adding to stocks of pig iron.

o o o

. . . Agricultural implement plants operating at peak.

ST. LOUIS, Feb. 23.—Pig iron sellers report that there has been a pick-up in spot orders during the last week or 10 days, and that melters are beginning to stock iron in anticipation of higher prices prevailing when the books of makers are opened on March 1 for second quarter shipment. The melt in the St. Louis' area continues heavy. The agricultural implement trade is operating at a peak rate. Jobbing foundries are busy.

Production of ingots in the St. Louis district is at 84 per cent of capacity.

The stove industry is being retarded some by inability to get desired deliveries of sheets.

Business in finished steel continues heavy, the question of deliveries being uppermost in the minds of buyers and sellers alike. Demand for sheets is so keen that consumers are placing orders for second quarter shipments at the prices to prevail when the books are open for such shipments. Inquiries for building materials are light.

. . . New business gaining in the South.

o o o

. . . Production keeps pace with recent rate.

BIRMINGHAM, Feb. 23.—Production and shipments continue at steady rates. New business is being placed in larger volume.

Open hearth operations this week will be the same as last, 17 active units. Blast furnace operations are also unchanged, with 15 stacks in production.

Hardie-Tynes Mfg. Co. was one of the low bidders for control gates and appurtenances for the Marshall Ford dam in Texas.

U. S. Pipe & Foundry Co. shipped several thousand tons of pipe to the Pacific Coast last week, the shipment going from Mobile by boat.

Scrap is stronger, and there is a good demand for nearly all grades.

. . . St. Lawrence bridge bids to be taken March 10.

o o o

. . . Pig iron shipments are heavy.

BUFFALO, Feb. 23.—A bridge to be constructed over the St. Lawrence River at Thousand Island will take 5500 tons of structural steel, on which bids will be received March 10 by the Thousand Islands Bridge authority. Robinson & Steinman, New York, are the engineers. The steel will be divided between United States and Canadian interests, 3000 tons to the former and 2000 tons to the latter.

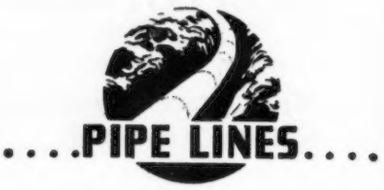
Bids will be taken Feb. 24 on a farm implement building at the New York State Fair Grounds, which will require 400 tons of steel.

A 100-ton structural addition to the plant of the Bucyrus-Erie Co., Erie, Pa., has been placed, as has a 250-ton State bridge in Russell, Warren County, Pa.

It is reported that the new Trico Products Corp. plant in Buffalo will require between 300 and 400 tons of reinforcing bars instead of the 150 tons first estimated.

Bethlehem's Lackawanna plant continues to operate 27 open hearths, having added one last week over the number estimated at the start of the week. Republic Steel Corp. is operating seven and Wickwire-Spencer Steel Co., two.

Pig iron producers report excellent shipments.



Panhandle Eastern Pipe Line Co., 101 West Eleventh Street, Kansas City., Mo., is considering new welded steel pipe line to Ann Arbor, Mich., connecting with main trunk line between Texas gas field and Detroit, about 20 miles, for natural gas transmission in Ann Arbor district. Project will be carried out in cooperation with Washtenaw Gas Co., Ann Arbor, which will build a control station at city limits and arrange pipe line facilities for local distribution.

General Purchasing Officer, Panama Canal, Washington, closes bids March 4 for 47,500 ft. galvanized welded steel pipe, ¼ to 4-in. diameter, and for 3300 ft. of black welded steel pipe, ½ to 5-in. diameter (Schedule 3225).

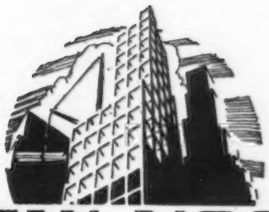
Hutchinson, Kan., plans steel pipe lines for natural gas distribution. A bond issue of $564,000 is proposed for this and main welded steel pipe line for trunk line, control and distributing station, and other operating facilities. H. P. Hertz is city engineer.

Carbide & Carbon Chemicals Corp., South Charleston, W. Va., has authorized immediate construction of new 4-in. welded steel pipe line from compressor station on Big Sandy River, near Neal, W. Va., to company plant at first noted place for natural gas transmission. New line will pass through Ceredo district, near Huntington. Main offices of company are in New York.

Humble Pipe Line Co., Humble Building, Houston, Tex., affiliated with Humble Oil & Refining Co., same address, has authorized new 8-in. welded steel pipe line from connection with present system at Melon, Tex., to point about seven miles from Devine, Tex., passing through Pearsall, for crude oil transmission, close to 40 miles in all. Cost over $300,000.

PWA, 1206 South Santee Street, Los Angeles, has let contract to Viking Automatic Sprinkler Co., Los Angeles, for 85,952 ft. of ¾ and 1-in. galvanized welded steel pipe, and to Santa Fe Pipe & Supply Co., Los Angeles, for 17,000 ft. of ¾ and 1-in. similar pipe, for water system in Griffith Park district.

Phillips Petroleum Co., Bartlesville, Okla., plans about 4700 ft. of 6-in. welded steel pipe in Lincoln Boulevard, Oklahoma City, for natural gas transmission. A H. Riney is company engineer.



. . . . NEW YORK. . . .

. . . Mill backlogs continue to mount.

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. . . Widespread price advances under consideration.

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. . . Continued export inquiry gives fillip to entire market.

NEW YORK, Feb. 23.—Apprehensive of possible holdups in future steel requirements, all classes of consumers continue to direct efforts to seeking positions on mill order books. This widespread desire to build up a good inventory position, coupled with a bulge in automobile specifications following the settlement of the strike, has additionally burdened mill backlogs to such an extent that several sellers have withdrawn from the flat-rolled steel market and other mills are considering commitments for sheets and strip only with the provision that price increases, if any, will rule at the time of shipment. At present it is almost impossible to get a delivery promise better than 14-15 weeks on hot-rolled sheets, 12 weeks on cold-rolled sheets, and 8 to 9 weeks on tin plate. The situation in electrical, enameling and stainless sheets is somewhat easier.

Judging from the similiarity of present price talk to that prior to past advances, it seems almost a certainty that second quarter quotations will show sizable advances throughout the entire list, the excuse for such action being that labor, coke, pig iron and especially scrap prices have all moved upward in varying degree over the past several months. Bars, plates, shapes, hot-rolled sheets, strip and skelp all will probably take a $2 rise, perhaps $3, nails will likely show even a greater advance, and consideration is being given to changes in small-size standard pipe and certain types of semi-finished material.

This market continues to be somewhat overstimulated by heavy foreign inquiry. Japanese steel makers about six months ago were discouraged by the forceful holding down of prices by the government and consequently neglected to stock sufficient raw materials and delayed the building of new capacity. A recent heavy bulge in consumer demands caught many makers short of steel, and they are now attempting to ease their position by buying in this country. And this situation is additionally aggravated by a concomitant bulge in demand here from Europe. A good tonnage of wire rods was sold during the week at a premium of $10 a ton and additional orders could find no takers, a sizable lot of tin plate was bought for export at a $5 premium and waste tin plate has been sold at premiums as high as $24 a ton. It has developed that some mills are mildly oversold on export business inasmuch as they are having difficulty in securing boat space. At the same time charter rates are approaching a peak level, and even at these higher prices it is difficult to secure an entire boat as most available bottoms are under contract for scrap shipments.

New structural steel business is lagging in this area, the largest award of the week being for the Midtown-Hudson tunnel and involving about 4000 tons of shapes and plates. Plate inquiry is holding its own, and railroad inquiry is at a comparatively low ebb, the only order of any size under consideration being an inquiry for 20 locomotives by the Canadian Pacific. Shipyards are still inactive buyers.

Pig Iron

Prices have been advanced $1 a ton, effective immediately. Low phosphorous iron has shared in the advance, making the base at Standish, N. Y., $26.50 a gross ton. Little iron has been sold to domestic users for several weeks, but inquiry may be stimulated by the price increase. A lot of iron is being shipped, however. On export business, which continues active, producers are now netting more than has been realized on domestic sales. Probably more than 200,000 tons of iron has been sold for export since the year began.

Reinforcing Steel

Little activity has been reported in the reinforcing bar market this week. Pending jobs include a Sheffield Farms building and work on the West Side elevated highway in New York, and a Coca-Cola building in Kearny, N. J., on which James Stewart & Co. are to be general contractors. About 1500 tons of bars is involved in these projects. Recent tonnages have not provided much of a test of prices.

Construction on the second tube of the Midtown Hudson Tunnel is getting under-way rapidly and the following steel awards were announced last week: to Bethlehem Steel Co., 1700 tons of tunnel bolts; to American Bridge Co., 723 tons of shapes, and to Federal Shipbuilding & Drydock Co., 527 tons of shapes, for the New York river shaft caisson; to Bethlehem, 346 tons of plates for curbings; to Carnegie-Illinois Steel Corp., 1056 tons of roadway beams; to Joseph T. Ryerson & Son, Inc., 120,000 lb. of sheets for fresh air flues, 673 tons of reinforcing steel, and 180 tons of wire mesh. Building of the rock tunnel and river shaft on the Jersey side has been sublet to the Underpinning & Foundation Co. This work will require about 2000 tons of structural steel.

REINFORCING STEEL

. . . Awards of 5200 tons —3065 tons in new projects.

AWARDS

New York, 673 tons, Midtown-Hudson tunnel, to Joseph T. Ryerson & Son, Inc.; also 180 tons of wire mesh.

New York, 250 tons, building for the Interboro News Co., to Bethlehem Steel Co.

Kearny, N. J., 1000 tons, building for Coca-Cola Co., to Bethlehem Steel Co.

Norristown, Pa., 388 tons, high school, to Concrete Engineering Co., Omaha, Neb.

Camp Custer, Mich., 125 tons, infirmary, to E. W. Sproul Construction Co.

Phoenix, Ariz., 550 tons, dam project for Bureau of Reclamation, to Concrete Engineering Co.

Chicago, 280 tons, American Commerce building, to Inland Steel Co.

Chicago, 200 tons, public school buildings, to unnamed bidders.

Chicago, 500 tons, Outer Drive, to Truscon Steel Co.

Reno, Nev., 180 tons, two bridges, to an unnamed bidder.

Los Angeles, 445 tons, Alameda Street bridge, to Bethlehem Steel Co.

Soda Springs, Cal., 118 tons, State highway project, to an unnamed bidder.

Aberdeen, Wash., 132 tons, bridge, to Bethlehem Steel Co.

Tacoma, Wash., 320 tons, overcrossing on city street, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Omaha, Neb., 850 tons, building for Armour & Co.

Harvey, Ill., 150 tons, Thornton Township high school.

Des Plaines, Ill., 220 tons, Sanitary District work.

Thatcher, Colo., 125 tons, bridge; bids Feb. 25.

Davis, Cal., 225 tons, university gymnasium; bids opened.

Pasadena, Cal., 700 tons, buildings for California Institute of Technology; bids March 4.

Los Angeles, 519 tons, Gene Wash and Copper Basin dams; bids March 18.

Los Angeles, 275 tons, Eagle Rock Canyon crossing; bids opened.

Harbison-Walker Refractories Co. for 1936 reports net earnings of $3,362,483, equal after preferred dividends, to $2.41 a share on the common. This compares with $1,805,669, or $1.20 a common share, in 1935. According to the report, last year's volume of business was 50 per cent better than 1935, and the company entered 1937 with a substantial backlog of orders. New business at the present time is in somewhat better volume than the corresponding period of 1936.

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Chrome Ore Prices Up; Imports Heavier

WHEN the statistics are available showing imports of chrome ore into the United States for the year 1936, they will show a great increase over importations for many years, according to one of the major importers. In addition to the ore used in the ferro-alloy business, greatly increasing quantities are being consumed in the chemical trade, and the available quantities from the well established mines in Africa have been almost entirely absorbed in the metallurgical and chemical industries. These industries can use quite a different quality than is required in the steel industry for refractory purposes and this industry has, up to the present, been able to obtain its supplies largely from Cuba and Greece.

The ore importer has also stated that it will be some time before it is ascertained whether the increasing requirements for chrome ore are responsible for the stiffening in price or whether it is entirely due to the ocean freight situation. In all events, it is apparent that there will come on the market shortly further quantities of ore from the Philippines and Turkey, the grade of which will have to be established by use, and it will be important to watch this situation during the next year to determine how the production of chrome ore will compare with its increasing use.

The quantity and quality of chrome ore available from new mines being opened in Turkey and the Philippine Islands may have bearing on the entire situation.

Another large importer of ore has stated that the advances in

chrome ore and manganese ore prices during the past year may be attributed to two basic factors: (1) labor difficulties and wage increases in the countries producing the ores, and (2) rapid and wide increases in the ocean freights from the producing countries to the United States, which has been considerably over 50 per cent in some instances. South African chrome ore is now priced at $16 a net ton, c.i.f. Atlantic seaboard, Rhodesian 45 per cent lump is $23, and Turkish 50 per cent concentrates is priced in the neighborhood of $24 a net ton, c.i.f.

. . . Scrap control agreement instituted as prices soar.

LONDON, Feb. 23, *(By Cable).*— Pig iron and steel output are at record levels, but are still inadequate, while a further expansion in demand is expected owing to defense requirements. Pig iron stocks are completely exhausted. All output is sold up to the end of June and makers have declined to accept business for later delivery.

Steel production increase is impeded by a shortage of pig iron and scrap. Some Welsh furnaces are closed and others elsewhere may follow.

Release of an additional tonnage of Continental semi-finished steel for the United Kingdom has been reported, but it is unlikely that it will become immediately available, and meanwhile British makers are unable to satisfy the demand.

There are enormous specifications for shipbuilding, constructional and railway steel. The special discounts granted shipbuilders are being discontinued after May.

Sheet makers are working at full capacity. Home prices on black and galvanized sheets are unaltered but deliveries after May are chargeable at prices then ruling.

Tin plate demand is good, but the shortage of steel is curtailing production. Higher prices are expected owing to tin firmness. Meanwhile up to 2s. premium is paid over official minima.

Continental iron and steel sales are still restricted by shortage. British and Continental gold prices are unchanged.

To overcome the difficulties created by the scarcity of scrap metal, British steel manufacturers have agreed to place the control of national supplies in the hands of two of the largest scrap metal concerns in the United Kingdom. It is felt that this will not only check prices from rising to prohibitive levels, but that it will contribute to the regulation of supplies to steel manufacturers in various parts of the country. The scarcity of scrap has been most acutely felt in West Wales, where there has been delay in the delivery of steel bars for conversion into tin plate. Some of the steel works in that district have had to close down for short periods due to the shortage.

The acute shortage of scrap has intensified the search for old ships for breaking up. During the second week in February sales of 15 old ships, aggregating approximately gross 52,000 tons, were reported in the shipping sales market. The buyers were shipbreakers in various parts of the world.

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FABRICATED STEEL

. . . Lettings decline to 12,350 tons from 39,430 tons last week.

o o o

. . . New projects in lower volume at 8880 tons as against 17,065 tons a week ago.

o o o

. . . Plate awards total only 871 tons.

NORTH ATLANTIC STATES

Newton, Mass., 100 tons, theater, to West End Iron Works, Cambridge, Mass.

Windham, Conn., 155 tons, highway bridge, to American Bridge Co.

New York, 4100 tons, north tube of Midtown Hudson tunnel, to American Bridge Co.

Brooklyn, 235 tons, Russek's store, to Harris Structural Steel Co., Plainfield, N. J.

Geneseo, N. Y., 430 tons, building No. 6, normal school, to Bethlehem Steel Co.

Norristown, Pa., 360 tons, high school, to Lehigh Structural Steel Co., Allentown, Pa.

Philadelphia, 385 tons, platforms and shelter sheds for Pennsylvania Railroad, 30th Street station; 170 tons to Bethlehem Steel Co., and 215 tons to Phoenix Bridge Co.

Philadelphia, 100 tons, channels for Pennsylvania Railroad electrification program, to Belmont Iron Works, Philadelphia.

Philadelphia, 250 tons, addition to E. G. Budd Mfg. Co. plant, to Belmont Iron Works.

Russell, Pa., 250 tons, Warren County State bridge, to Lackawanna Steel Construction Co., Buffalo.

Erie, Pa., 100 tons, plant addition for Bucyrus-Erie Co., to Rogers Structural Steel Co.

Baltimore, 405 tons, shop building for Rustless Iron & Steel Corp., to Baltimore Steel Co.

Forty Fort, Pa., 228 tons, storage building for Luzerne County Gas & Electric Co., to Belmont Iron Works.

THE SOUTH

Franklin, Va., 650 tons, paper mill, Chesapeake Camp Corp., to Ingalls Iron Works Co.

State of Tennessee, 250 tons, service bay structure, Pickwick Landing power plant for TVA, to Wisconsin Bridge & Iron Co.

Itawamba County, Miss., 242 tons, bridge, to Vincennes Bridge Co., Vincennes, Ind.

Beverly, Tex., 256 tons, hoist bridge and runways for Lower Colorado River Authority, to Austin Brothers, Dallas, Tex.

CENTRAL STATES

Cincinnati, 135 tons, warehouse for Crosley Corp., to Oregonia Bridge Co., Lebanon, Pa.

Atchison County, Kan., 1550 tons, Missouri River bridge, to Wisconsin Bridge & Iron Co.

Benton County, Mo., 570 tons, bridge, to Vincennes Bridge Co.

WESTERN STATES

Denver, 102 tons, six bridges, to an unnamed bidder.

Buhl, Idaho, 120 tons, gates for Ebasco Services, Inc., to American Bridge Co.

Kobuk River, Alaska, 576 tons, bridge, to Wisconsin Bridge & Iron Co., N. Milwaukee.

Seattle, 225 tons, two bridges, to Poole & McGonigle, Portland, Ore.

Seattle, 200 tons, pulp house for Shell Oil Co., to Bethlehem Steel Co.

Tacoma, Wash., 120 tons, building construction, to Pacific Car & Foundry Co.

Pasco, Wash., 250 tons, Pasco-Kennewick State bridge, to Poole & McGonigle.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Ludlow-Wilbraham, Mass., 200 tons, State bridge.

Lancaster, Mass., 100 tons, State bridge.

New York, 450 tons, express highway viaduct, West 177th Street to West 180th Street for New York Central Railroad.

Syracuse, N. Y., 350 tons, farm machinery buildings, Industrial Exhibit Authority.

Collins Landing, N. Y., 3000 tons, Thousand Islands International Bridge for Thousand Islands Bridge Authority; Robinson & Steinman, New York, engineers; bids postponed to March 10. An additional 2500 tons will be let in Canada for Canadian portion of bridge.

Middlesex County, N. J., 350 tons, State bridge; bids March 8.

Atlantic County, N. J., 272 tons, highway project; bids at Trenton March 8.

Philadelphia, 450 tons, Pennsylvania Railroad station.

Philadelphia, 400 tons, alterations to Dock Street freight station, Pennsylvania Railroad.

State of Pennsylvania, 600 tons, highway bridges in 10 counties; bids at Harrisburg, March 5.

Pittsburgh, 500 tons, washer for Edgar Thomson works.

SOUTH AND SOUTHWEST

Norfolk, Va., 400 tons, shop and extension to building No. 171, Navy Yard.

Frankfort, Ky., 1100 tons, Kentucky River State bridge.

Houston, Tex., 250 tons, Preston-Fairfax building, Southwestern Bell Telephone Co.

State of Arizona, 2000 tons, regulating gates for Government project.

CENTRAL STATES

Defiance, Ohio, 400 tons, State bridge; bids March 3.

Neenah, Wis., 400 tons, warehouse for Kimberly Clark Corp.

WESTERN STATES

Thatcher, Colo., 172 tons, bridge; bids Feb. 25.

San Francisco, 180 tons, Standard Oil stacks; bids opened.

Pasadena, Cal., 300 tons, four buildings for California Institute of Technology; bids March 4.

FABRICATED PLATES

AWARDS

New York, 346 tons, Midtown-Hudson tunnel curbings, to Bethlehem Steel Co.

Harrison, N. J., 155 tons, 16 tanks for National Oil Products Co., to Dover Boiler Works.

Philadelphia, 370 tons, bearing plates for Pennsylvania Railroad electrification work; 250 tons to By-Products Steel Co., 120 tons to Belmont Iron Works.

NEW PROJECTS

Detroit, 2000 tons, blast furnace for Great Lakes Steel Corp.

Hamilton, Ohio, 2000 tons, blast furnace for Hamilton Coke & Iron Co.

SHEET PILING

AWARDS

Chicago, 685 tons, rehabilitation of pier and jetty, Burnham Park, Chicago, to Inland Steel Corp.

Fort Peck, Mont., 387 tons, Fort Peck dam project, to Bethlehem Steel Co.

Chesapeake City, Del., 950 tons, bridge alterations over Chesapeake and Delaware Canal; 250 tons to Carnegie-Illinois Steel Corp., 700 tons to Bethlehem Steel Co. In addition, 150 tons of H-piles were awarded to Phoenix Bridge Co.

Weight of hoppers for bottom dump coal trucks built by the Euclid Road Machinery Co., Euclid, Ohio, was reduced nearly 25 per cent or from 4600 to 3500 lb. by the use of Yoloy nickel copper alloy steel produced by the Youngstown Sheet & Tube Co. Six trucks with hoppers of this steel of high tensile strength and having resistance to atmospheric corrosion were built for the Traux-Traer Coal Co., which attained a record haul of 3950 tons from its Forsythe strip mine in southern Illinois. The average load over a 7-hr. shift was 20.8 tons.

. . . NON-FERROUS . . .

. . . *Copper market disrupted by London influence.*

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. . . *Lead advanced $10 a ton, zinc $8 a ton.*

NEW YORK, Feb. 24.—Excitement prevailed in copper last week, as the foreign market, influenced by armament buying and speculative purchases as well, began a spectacular advance which culminated in a price at one point of well over 17.00c. a lb. Coming on the heels of prior increase in the domestic quotation for electrolytic to 14.00c., Valley, American producers, though reluctant to take action, were constrained to right the situation in one way or another. This they did in the main by withdrawing from the market, but as the week ended one large seller boosted his price 1c. to 15c. a lb., Valley, and announced having immediately made a sale at that figure. Finally, at a late hour yesterday the market generally was conceded to have advanced to 15.00c. With sellers out of the market, however, the latter quotation is largely nominal. In London, speculative stampeding of the market received a set-back upon announcement that the British government would attempt to restrain influences interfering with its purchases of the metal for armament purposes.

Lead

Speculative buying abroad forced prices in London upward last week, and, as consumers on this side sought to protect themselves against upward adjustment of the domestic market, the expected increase in quotations materialized. Prices were advanced $5 a ton on Feb. 18 and $5 a ton additional on Feb. 19, and consequently lead now sells in the domestic market at 6.50c. and 6.55c. a lb., New York, and at 6.35c., St Louis. Inasmuch as the London quotations, however, are today being based on an equivalent of about 6.66c. a lb., further possible increases here are looked for. Domestic buying has been heavy for the past 10 days, and no abatement is in sight.

Zinc

The spelter market played a role similar to that enacted in lead last week, and on two successive days prices moved up by $4 a ton. First advance came on Feb. 18, when the East St. Louis quotation for zinc rose from 6.40c. a lb. to 6.60c. Then on the day following producers concurred in another general boost of $4 a ton to a 6.80c. level. Despite opportunity to sell, some producers lacked supplies and turned thumbs down to the trade. Others pursued a cautious policy of accepting requests only from known legitimate interests in order to prevent metal from falling into the hands of speculators.

Tin

Prices advanced sharply during the week, as tin at London acted in sympathy with other metals. There was considerable buying by American interests as the move got under way, and on Saturday, ordinarily a dull day, approximately 1000 tons was sold here. Prices were then at a peak, the basis for trading being the New York spot Straits quotation of 54.87½c. a lb. On Feb. 22 the market remained closed, but opened the next day at a further advance to 55.65c. for spot Straits at New York. Demand faltered at this level, though, with a break in the market today to about 54.75c., buyers are again reported active.

The Week's Prices. Cents Per Pound for Early Delivery

	Feb. 17	Feb. 18	Feb. 19	Feb. 20	Feb. 23	Feb. 24
Electrolytic copper, Conn.*	14.00	14.00	14.00	15.00	15.00	15.00
Lake copper, N. Y.	14.12½	14.12½	14.12½	15.12½	15.12½	15.12½
Straits tin, spot, New York	51.75	52.25	53.75	54.87½	55.65	54.75
Zinc, East St. Louis	6.40	6.60	6.80	6.80	6.80	6.80
Zinc, New York	6.75	6.95	7.15	7.15	7.15	7.15
Lead, St. Louis	5.85	6.10	6.35	6.35	6.35	6.35
Lead, New York	6.00	6.25	6.50	6.50	6.50	6.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin 99 per cent plus 19.00c.-21.00c. a lb. delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 17.00c. a lb. delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 16.00c. a lb., New York.
Quicksilver, $90.00 to $92.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 13.75c. a lb. delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse
Delivered Prices, Base per Lb.

Tin, Straits pig	57.00c. to 58.00c.
Tin, bar	59.00c. to 60.00c.
Copper, Lake	16.00c. to 18.50c.
Copper, electrolytic	16.00c. to 18.50c.
Copper, castings	15.25c. to 18.00c.
*Copper sheets, hot-rolled	20.37½c.†
*High brass sheets	18.12½c.†
*Seamless brass tubes	20.87½c.†
*Seamless copper tubes	21.37½c.†
*Brass rods	16.12½c.†
Zinc, slabs	7.50c. to 8.50c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	11.75c.
Lead, American pig	7.50c. to 8.50c.
Lead, bar	8.50c. to 9.50c.
Lead, sheets, cut	8.75c.
Antimony, Asiatic	15.00c. to 16.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ½	35.00c. to 36.00c.
Babbitt metal, commercial grades	25.00c. to 65.00c.

† Nominal.
* These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse
Delivered Prices per Lb.

Tin, Straits pig	59.60c.
Tin, bar	61.60c.
Copper, Lake	15.12½c. to 15.25c.†
Copper, electrolytic	15.12½c. to 15.25c.†
Copper, castings	14.87½c. to 15.00c.†
Zinc, slabs	8.25c. to 8.75c.
Lead, American pig	7.00c. to 7.25c.
Lead, bar	9.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	24.50c.
Babbitt metal, high grade	63.60c.
Solder, ½ and ½	35.00c.

† Nominal.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	11.12½c.	11.87½c.
Copper, hvy. and wire	11.00c.	11.50c.
Copper, light and bottoms	10.00c.	10.25c.
Brass, heavy	7.12½c.	7.75c.
Brass, light	6.25c.	7.00c.
Hvy. machine composition	10.25c.	10.75c.
No. 1 yel. brass turnings	8.37½c.	8.87½c.
No. 1 red brass or compos. turnings	9.87½c.	10.37½c.
Lead, heavy	5.25c.	5.62½c.
Cast aluminum	12.12½c.	13.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	3.25c.	3.62½c.

IRON AND STEEL SCRAP

. . . Composite figure up 67c. to $19.92 a gross ton.

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. . . Further rises indicated as heavy buying develops.

THE spectacular rise in scrap values over the past several months still shows no indication of coming to a halt. Under the stimulus of extremely heavy demands, an attractive outlook for the continuance of these demands, heavy export sales and a general bullish psychology pervading the industry, the prices for important steel-making grades of scrap took a sharp upward turn in all principal districts during the week. This movement has been reflected in a 67c. advance in the average price for No. 1 steel to $19.92 a gross ton.

Export activity continues to boom. Sizable quantities have recently been sold at $20 or better, c.i.f., and the total backlog of foreign business now is about 600,000 tons, all calling for delivery before the fall. Deliveries are being delayed somewhat by a tight boat situation, which is reflected in rapidy advancing charter rates.

Pittsburgh

With sales of No. 1 into consumption during the past week at $20.25, $20.50 and $21, the market is exceptionally strong and apparently the peak has not yet been reached. The last named sale takes the price of No. 1 up $1 a ton, making it quotable at $20.50 to $21. To say supplies are hard to get is putting it mildly. Some dealers are offering $20 to cover and are obtaining only one or two cars, while in one instance $20.50 has been offered by brokers with practically no takers. Railroad heavy melting is up 50c. to $21.50, but it is expected that coming railroad lists will bring better than this price.

Cleveland

Increased strength is in evidence in the market, reflecting the maintenance of present heavy consumption and an apparent decrease in the supply. Steel-making grades have advanced 50c. to $1 a ton in Cleveland and are 50c. a ton higher in the Youngstown district, where small-lot sales have been made at $20 for No. 1 and $19 for No. 2 steel. No consumer activity is reported in the Cleveland district, where No. 1 steel is now quoted as high as $18.50. Foundry scrap is very scarce and higher.

Philadelphia

Although there has been no recent buying of heavy melting steel, there is a growing conviction among sellers that the next sale will bring at least $19. The maintenance of an $18 offering price for export material and several purchases at around $18.50 by the largest district consumer, have combined to strengthen the quotation for this grade, which is now listed at $18.50 to $19.00. On the basis of sales during the week, other grades were advanced from 50c. to $1. Export supplies are coming out freely, and large accumulations of scrap are on cars at Port Richmond awaiting the arrival of six or more boats during the next 30 days.

Buffalo

All commodities are strong here. Dealers are busy shipping on heavy orders previously taken, and indications are that prices will go higher. Sales of short rails at $22 and low-phos billet crops at $22.50 are noted, but for the time being the needs of the larger consumers for No. 1 and No. 2 steel seem to have been satisfied.

Boston

No. 1 and 2 steel for Pittsburgh delivery have been marked up $1 a ton, but aside from scattered lots from northern New England sales have been nil due to the tight position of the export market. No. 1 steel for export is $16.50 a ton, delivered army base, as against $16.25 to $16.50 a week ago, and No. 2 steel is $15.50 a ton. Prices for Pittsburgh delivery of steel turnings and bundled skeleton are firmer, as are those for eastern Pennsylvania delivery of breakable cast. The market for textile and machinery cast is very much firmer, sales being reported in the Providence district at $16.50 a ton delivered, and in western Massachusetts at $18.

Cincinnati

This market is strong in sympathy with activity elsewhere, but demand is small. The trade is moving in anticipation of heavy needs against high steel-making rates during the second quarter. Movement on contract is at a good rate, although some users are still holding up material to complete flood rehabilitation.

St. Louis

This market continues its upward climb, advances being made by St. Louis dealers in efforts to bring out tonnages to cover short interests, which are said to be heavy. Advances were from 25c. to $1 a ton on some items.

Detroit

This market continues very strong and principal grades including heavy melting steel have advanced 50c. a ton. With practically no taking of scrap on the part of local mills, principal influences are sales to mills in Chicago, Pittsburgh and Valley districts. Opening up of boat shipments to Cleveland and Buffalo beginning March 1 will further stimulate out-of-town shipments.

Chicago

Brokers are paying little attention to steel mill offers of $21 for heavy melting steel, and they freely bid $20.50 for carloads. There is not a single factor that is not in favor of a still stronger market, notwithstanding that sales in recent days have set new post-depression highs. Mills are accepting all the tonnage sent to their tracks, and they are using this scrap as fast as it reaches them. Plate scrap and punchings are scarce and prices are soaring, as are the cast grades which also are in excellent demand.

New York

Heavy melting steel scrap for domestic shipment has been advanced 50c. a ton, and New York dealers are now offering $15 to $15.50 a gross ton for No. 1 steel and $14 to $14.50 for No. 2. Movement of material to the mills is very active, as steel makers have tended to increase operations over the past fortnight, thus creating a greater need for scrap. Most dealers are in a heavily booked position, and are finding some grades hard to draw out even at prevailing high prices. Advances have been made in certain cast grades as well as in the principal steel mill items. The export market continues to exert a strong influence, with heavy melting steel 50c. higher in this direction also.

Aluminum Co. Grants Wage Increase

PITTSBURGH, Feb. 24.—A 10 per cent increase in wages affecting 20,000 Aluminum Co. of America employees, 6500 of whom are in the Pittsburgh district, has been granted by the company and will become effective March 1. It is reported that the pay boost is in addition to a number of individual and group adjustments made by plant officials in the last 60 days. The latest pay raise follows a 5 per cent increase granted last September. It is expected that the total cost of the wage increase will approximate $3,000,000 annually.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	$20.50 to $21.00
Railroad hvy. mltng. ..	21.00 to 21.50
No. 2 hvy. mltng. steel.	18.50 to 19.00
No. 2 RR. wrought	20.50 to 21.00
Scrap rails	21.00 to 21.50
Rails, 3 ft. and under..	22.50 to 23.00
Comp. sheet steel	20.50 to 21.00
Hand. bundled sheets.	19.50 to 20.00
Hvy. steel axle turn...	18.50 to 19.00
Machine shop turn.....	14.00 to 14.50
Short shov. turn.	14.50 to 15.00
Mixed bor. & turn.....	13.50 to 14.00
Cast iron borings	14.00 to 14.50
Cast iron carwheels...	18.50 to 19.00
Hvy. breakable cast....	15.50 to 16.00
No. 1 cast	17.50 to 18.00
RR. knuckles & cplrs..	25.50 to 26.00
Rail coil & leaf springs	25.50 to 26.00
Rolled steel wheels....	25.50 to 26.00
Low phos. billet crops.	26.00 to 26.50
Low phos. sh. bar....	25.00 to 25.50
Low phos. punchings..	24.00 to 24.50
Low phos. plate scrap.	24.50 to 25.00
Steel car axles	24.00 to 24.50

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	$18.00 to $18.50
No. 2 hvy. mltng. steel.	17.00 to 17.50
Comp. sheet steel	17.00 to 17.50
Light bund. stampings	13.00 to 13.50
Drop forge flashings...	16.50 to 17.00
Machine shop turn.....	12.25 to 12.75
Short. shov. turn.	12.75 to 13.25
No. 1 busheling	16.50 to 17.00
Steel axle turnings	15.00 to 15.50
Low phos. billet crops	22.00 to 22.50
Cast iron borings	12.75 to 13.25
Mixed bor. & turn....	12.75 to 13.25
No. 2 busheling	12.75 to 13.25
No. 1 cast	21.00 to 21.50
Railroad grate bars...	12.00 to 12.50
Stove plate	10.00 to 10.50
Rails under 3 ft.	24.50 to 25.00
Rails for rolling	21.50 to 22.00
Railroad malleable ...	18.00 to 18.50
Cast iron carwheels....	18.50 to 19.00

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	$18.50 to $19.00
No. 2 hvy. mltng. steel.	17.50 to 18.00
Hydraulic bund., new.	18.00 to 18.50
Hydraulic bund., old..	16.00 to 16.50
Steel rails for rolling..	18.50 to 19.00
Cast iron carwheels..	18.50 to 19.00
Hvy. breakable cast ..	.... 18.00
No. 1 cast.....	19.00 to 19.50
Stove plate (steel wks.)	14.50 to 15.00
Railroad malleable	18.50 to 19.00
Machine shop turn....	12.50 to 13.00
No. 1 blast furnace....	11.00 to 11.50
Cast borings	11.00 to 11.50
Heavy axle turnings..	17.50 to 18.00
No. 1 low phos. hvy....	24.00 to 24.50
Couplers & knuckles ..	24.50 to 25.00
Rolled steel wheels ...	24.50 to 25.00
Steel axles	24.50 to 25.00
Shafting	23.00 to 23.50
No. 1 RR. wrought ...	18.50 to 19.00
Spec. iron & steel pipe	16.50 to 17.00
No. 1 forge fire	16.50 to 17.00
Cast borings (chem.).	12.00 to 13.00

CHICAGO

Delivered to Chicago district consumers:	*Per Gross Ton*	
Hvy. mltng. steel	$20.00	to $20.50
Auto. hvy. mltng. steel.	19.00	to 19.50
Alloy free	18.50	to 19.00
Shoveling steel	20.00	to 20.50
Hydraul. comp. sheets.	19.50	to 20.00
Drop forge flashings..	16.50	to 17.00
No. 1 busheling	18.00	to 18.50
Rolled carwheels	22.00	to 22.50
Railroad tires, cut	22.25	to 22.75
Railroad leaf springs..	22.00	to 22.50
Axle turnings	18.50	to 19.00
Steel coup. & knuckles	22.00	to 22.50
Coil springs	24.00	to 24.50
Axle turn. (elec.)	19.25	to 19.75
Low phos. punchings..	23.00	to 23.50
Low phos. plates, 12 in. and under	23.00	to 23.50
Cast iron borings	11.25	to 11.75
Short shov. turnings..	12.50	to 13.00
Machine shop turn. ...	10.75	to 11.25
Rerolling rails	21.50	to 22.00
Steel rails under 3 ft...	21.75	to 22.25
Steel rails under 2 ft...	23.00	to 23.50
Angle bars, steel	21.25	to 21.75
Cast iron carwheels ..	19.50	to 20.00
Railroad malleable	21.75	to 22.25
Agric. malleable	18.75	to 19.25
	Per Net Ton	
Iron car axles	26.50	to 27.00
Steel car axles	$22.50	to $23.00
No. 1 RR. wrought....	18.50	to 19.00
No. 2 RR. wrought....	18.50	to 19.00
No. 2 busheling, old..	9.00	to 9.50
Locomotive tires	19.50	to 20.00
Pipes and flues	14.50	to 15.00
No. 1 machinery cast...	17.00	to 17.50
Clean auto. cast	15.50	to 16.00
No. 1 railroad cast	15.75	to 16.25
No. 1 agric. cast	13.50	to 14.00
Stove plate	12.25	to 12.75
Grate bars	13.50	to 14.00
Brake shoes	13.50	to 14.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:	
No. 1 hvy. mltng. steel.	$18.50 to $19.00
No. 2 hvy. mltng. steel.	17.00 to 17.50
Scrap rails	17.50 to 18.00
New hy. b'ndled sheet	17.00 to 17.50
Old hydraul. bundles ..	16.00 to 16.25
Drop forge flashings ..	17.00 to 17.50
No. 1 busheling	17.00 to 17.50
Hvy. axle turnings....	11.00 to 11.50
Machine shop turn ...	12.50 to 12.75
Knuckles & couplers..	21.00 to 21.50
Coil & leaf springs....	21.00 to 21.50
Rolled steel wheels....	21.00 to 21.50
Low phos. billet crops.	21.50 to 22.00
Shov. turnings	13.50 to 14.00
Mixed bor. & turn.	12.50 to 12.75
Cast iron borings	12.50 to 12.75
Steel car axles	20.50 to 21.00
No. 1 machinery cast..	18.00 to 18.50
No. 1 cupola cast	16.50 to 17.00
Stove plate	13.50 to 14.00
Steel rails under 3 ft...	21.50 to 22.00
Cast iron carwheels...	16.00 to 16.50
Railroad malleable	18.50 to 19.00
Chemical borings	13.00 to 13.50

BIRMINGHAM

Per gross ton delivered to consumer:	
Hvy. melting steel.....	$15.00 to $15.50
Scrap steel rails	15.00 to 15.50
Short shov. turnings ..	7.50 to 8.00
Stove plate	8.50 to 9.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought....	12.50 to 13.00
Rails for rolling	16.00 to 17.00
No. 1 cast	14.50 to 15.00
Tramcar wheels	.... 14.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:	
Selected hvy. steel....	$18.00 to $18.50
No. 1 hvy. melting....	17.50 to 18.00
No. 2 hvy. melting....	15.25 to 15.75
No. 1 locomotive tires..	18.00 to 18.50
Misc. stand.-sec. rails.	18.25 to 18.75
Railroad springs	20.00 to 20.50
Bundled sheets	11.00 to 11.50
No. 2 RR. wrought ...	17.50 to 18.00
No. 1 busheling	14.00 to 14.50
Cast bor. & turn.....	5.50 to 6.00
Rails for rolling	18.50 to 19.00
Machine shop turn....	7.50 to 8.00
Heavy turnings	12.50 to 13.00
Steel car axles	21.50 to 22.00
Iron car axles	22.00 to 22.25
No. 1 RR. wrought	14.00 to 14.50
Steel rails under 3 ft. ..	19.00 to 19.50
Steel angle bars	18.00 to 18.50
Cast iron carwheels...	16.50 to 17.00
No. 1 machinery cast.	13.00 to 13.50
Railroad malleable ...	17.50 to 18.00
No. 1 railroad cast....	13.25 to 13.75
Stove plate	11.25 to 11.75
Agricul. malleable	12.50 to 13.00
Grate bars	11.50 to 12.00
Brake shoes	13.00 to 13.50

CINCINNATI

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. steel.	$16.00 to $17.00
No. 2 hvy. mltng. steel.	13.75 to 14.25
Scrap rails for mltng...	16.50 to 17.00
Loose sheet clippings..	10.50 to 11.00
Bundled sheets	11.50 to 12.00
Cast iron borings	8.50 to 9.00
Machine shop turns....	9.50 to 10.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	8.00 to 8.50
Rails for rolling	17.00 to 17.50
No. 1 locomotive tires.	14.25 to 14.75
Short rails	20.00 to 20.50
Cast iron carwheels...	15.50 to 16.00
No. 1 machinery cast..	16.25 to 16.75
No. 1 railroad cast	15.25 to 15.75
Burnt cast	11.25 to 11.75
Stove plate	11.25 to 11.75
Agricult. malleable ...	15.50 to 16.00
Railroad malleable	17.00 to 17.50

DETROIT

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. steel.	$15.50 to $16.00
No. 2 hvy. mltng. steel.	14.75 to 15.25
Borings and turnings..	11.50 to 12.00
Long turnings	11.00 to 11.50
Short shov. turnings..	12.00 to 12.50
No. 1 machinery cast..	15.00 to 15.50
Automotive cast	16.25 to 16.75
Hydraul. comp. sheets.	16.25 to 16.75
Stove plate	9.75 to 10.25
New factory bushel ...	15.50 to 16.00
Old No. 2 busheling ..	10.50 to 11.00
Sheet clippings	12.25 to 12.75
Flashings	15.00 to 15.50
Low phos. plate scrap.	17.50 to 18.00

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	$19.50 to $20.00
Hydraulic bundles	19.00 to 19.50
Machine shop turn....	14.50 to 15.00

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 hvy. mltng. steel.	14.00 to 14.50
Hvy. breakable cast...	14.00 to 14.50
No. 1 machinery cast.	15.50 to 16.00
No. 2 cast	12.50 to 13.00
Stove plate	10.75 to 11.25
Steel car axles	22.00 to 23.00
Shafting	19.00 to 20.00
No. 1 RR. wrought	13.50 to 14.00
No. 1 wrought long....	12.50 to 13.00
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	16.00 to 16.50
Clean steel turnings...	8.75 to 9.25
Cast borings	8.75 to 9.00
No. 1 blast furnace	8.75 to 9.00
Cast borings (chem.)..	11.00 to 11.50
Unprepar. yard scrap.	9.00 to 10.00
Per gross ton, delivered local foundries:	
No. 1 machn. cast.....	$16.00 to $16.50
No. 1 hvy. cast cupola.	12.50 to 13.00
No. 2 cast	11.50 to 12.00

Add 25c. to 50c. to above quotations to secure North Jersey prices.

BOSTON

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. steel.	$14.80 to $15.30
Scrap rails	14.80 to 15.30
No. 2 steel	13.05 to 13.25
Breakable cast	13.00 to 13.25
Machine shop turn.....	8.50 to 8.75
Unmixed bor. & turn..	7.00 to 8.25
Bund. skeleton long...	12.25 to 12.50
Shafting	16.75 to 17.00
Cast bor. chemical.....	7.00 to 8.75
Per gross ton delivered consumers' yards:	
Textile cast	$16.50 to $18.00
No. 1 machine cast ...	16.50 to 18.00
Stove plate	10.00 to 10.50

EXPORT

Dealers' buying prices per gross ton:	
New York, delivered alongside barges	
No. 1 hvy. mltng. steel.	$14.50
No. 2 hvy. mltng. steel.	13.50
No. 2 cast	13.00
Stove plate	11.00
Steel rails (scrap)	14.50
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	$16.25 to $16.50
No. 2 hvy. mltng. steel.	15.25 to 15.50
Rails (scrap)	16.50
Stove plate	7.75 to 8.00
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.	$18.00
No. 2 hvy. mltng. steel.	17.00
New Orleans, on cars at Stuyvesant Dock	
No. 1 hvy. mltng. steel.	$14.25
No. 2 hvy. mltng. steel.	13.25
Los Angeles, on cars or trucks at local piers	
No. 1 hvy. mltng. steel.	$10.50 to $11.00
Compressed bundles ..	8.50 to 9.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Lb.
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$34.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.80c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$43.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	44.00
F.o.b. Worcester, Mass.	45.00
F.o.b. Birmingham	46.00
F.o.b. San Francisco	52.00
F.o.b. Galveston	49.00

Rods over 9/32 in. to 47/64 in., inclusive, $4 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.20c.
F.o.b. Chicago or Gary	2.25c.
F.o.b. Duluth	2.35c.
Del'd Detroit	2.35c.
F.o.b. Cleveland	2.25c.
F.o.b. Buffalo	2.30c.
Del'd Philadelphia	2.51c.
Del'd New York	2.55c.
F.o.b. Birmingham	2.35c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars Pacific ports	2.75c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.05c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.10c.
F.o.b. Buffalo	2.15c.
F.o.b. Birmingham	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.25c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.30c.
Del'd Detroit	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.65c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.10c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.15c.
F.o.b. cars dock Gulf ports	2.50c.
F.o.b. cars dock Pacific ports	2.50c.

Iron

F.o.b. Chicago	2.15c.
F.o.b. Pittsburgh (refined)	3.25c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.55c.
F.o.b. Cleveland, Chicago and Gary	2.60c.
F.o.b. Buffalo	2.65c.
Del'd Detroit	2.70c.
Del'd eastern Michigan	2.75c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago or Gary	2.10c.
Del'd Cleveland	2.235c.
F.o.b. Coatesville or Spar. Pt.	2.15c.
Del'd Philadelphia	2.235c.
Del'd New York	2.33c.
F.o.b. Birmingham	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.
Wrought iron plates, f.o.b. Pittsburgh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.60c.
F.o.b. Chicago	3.65c.
F.o.b. Coatesville	3.70c.
F.o.b. cars dock Gulf ports	4.00c.
F.o.b. cars dock Pacific ports	4.15c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
Del'd Cleveland	2.235c.
F.o.b. Buffalo or Bethlehem	2.15c.
Del'd Philadelphia	2.255c.
Del'd New York	2.305c.
F.o.b. Birmingham (standard)	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.60c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.40c.
F.o.b. Chicago or Buffalo	2.50c.
F.o.b. cars dock Gulf or Pacific Coast ports	2.85c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$39.00
Angle bars, per 100 lb.	2.55c. to 2.70c.

F.o.b. Basing Points

Light rails (from billets) per gross ton	$38.00
Light rails (from rail steel) per gross ton	37.00

	Base per Lb.
Spikes	2.90c.
Tie plates, steel	2.10c.
Tie plates, Pacific Coast ports	2.20c.
Track bolts, to steam railroads	4.00c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.15c.
No. 10, f.o.b. Gary	2.25c.
No. 10, del'd Detroit	2.35c.
No. 10, del'd Philadelphia	2.46c.
No. 10, f.o.b. Birmingham	2.30c.
No. 10, f.o.b. cars dock Pacific ports	2.70c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.80c.
No. 24, f.o.b. Gary	2.90c.
No. 24, del'd Detroit	3.00c.
No. 24, del'd Philadelphia	3.11c.
No. 24, f.o.b. Birmingham	2.95c.
No. 24, f.o.b. cars dock Pacific ports	3.45c.
No. 24, wrought iron, Pittsburgh	4.50c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.80c.
No. 10 gage, f.o.b. Gary	2.90c.
No. 10 gage, f.o.b. Detroit	3.00c.
No. 10 gage, del'd Philadelphia	3.11c.
No. 10 gage, f.o.b. Birmingham	2.95c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.40c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.25c.
No. 20 gage, f.o.b. Gary	3.35c.
No. 20 gage, del'd Detroit	3.45c.
No. 20 gage, del'd Philadelphia	3.56c.
No. 20 gage, f.o.b. Birmingham	3.40c.
No. 20 f.o.b. cars dock Pacific ports	3.80c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.40c.
No. 24, f.o.b. Gary	3.50c.
No. 24, del'd Philadelphia	3.71c.
No. 24, f.o.b. Birmingham	3.55c.
No. 24, f.o.b. cars dock Pacific ports	4.00c.
No. 24, wrought iron, Pittsburgh	5.15c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.70c.
F.o.b. Gary	3.80c.
F.o.b. cars dock Pacific ports	4.40c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.20c.
No. 20, f.o.b. Gary	3.30c.
No. 20, f.o.b. Birmingham	3.80c.
No. 20, f.o.b. cars dock Pacific ports	3.80c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.95c.
No. 28, Gary	3.05c.
No. 28, cars dock Pacific ports, boxed	3.825c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$4.85
Standard cokes, f.o.b. Gary	4.95

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes
Manufacturing Ternes

	Per Base Box
F.o.b. Pittsburgh	*$4.15
F.o.b. Gary	* 4.25

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strip and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.15c.
All widths up to 24 in., Chicago	2.25c.
All widths up to 24 in., del'd Detroit	2.35c.
All widths up to 24 in., Birmingham	2.30c.
Cooperage stock, Pittsburgh	2.25c.
Cooperage stock, Chicago	2.35c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	2.85c.
F.o.b. Cleveland	2.85c.
Del'd Chicago	3.13c.
F.o.b. Worcester	3.05c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	2.85c.	3.05c.
Carbon	.51- .75	3.95c.	4.15c.
Carbon	.76-1.00	5.70c.	5.90c.
Carbon	Over 1.00	7.75c.	7.95c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.10c.
No. 14, Worcester	3.50c.
No. 20, Pittsb'gh or Cleveland	3.50c.
No. 20, Worcester	3.90c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Spring wire	3.20c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.50
Smooth coated nails	2.50
	Base per 100 Lb.
Annealed fence wire	$2.90
Galvanized fence wire	3.30
Polished staples	3.20
Galvanized staples	3.45
Barbed wire, galvanized	3.05
Twisted barbless wire	3.05
Woven wire fence, base column	67.00
Single loop bale ties, base column	58.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	..57	37	¼ & ⅜	+6	+26
¼ to ⅜	.60	44½	½	..27	10½
½	..64½	55	¾	..32	16
¾	..67½	59	1 & 1¼	.35	21
1 to 3	..69½	61½	1½	..39	23½
			2	..38½	23

Lap Weld

2	..62	53½	2	..32½	18
2½ to 3	.65	56½	2½ to 3½	33½	20½
3½ to 6	.67	58½	4 to 8	..35½	24
7 & 8	.66	56½	9 to 12	..28½	15
9 & 10	.65½	56			
11 & 12	.64½	55			

Butt Weld, extra strong, plain ends

⅛	..55½	42½	¼ & ⅜	.+7	+39
¼ to ⅜	.57½	46½	½	..28	13
½	..62½	54½	¾	..33	18
¾	..66½	58½	1 to 2	..39	24½
1 to 3	..68	61			

Lap Weld, extra strong, plain ends

2	..60	52½	2	..35½	21½
2½ to 3	.64	56½	2½ to 4	.41	28½
3½ to 6	.67½	60	4½ to 6	.40½	28
7 & 8	..66½	57	7 & 8	..41½	28½
9 & 10	..65½	56	9 to 12	..32	20½
11 & 12	..64½	55			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2¼ in. o.d.	12 B.W.G.	17.61	16.01
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	$21.45	$19.50
3½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.90

Extra for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$50.00
6-in. and larger, del'd New York	48.00
*6-in. and larger, Birmingham	42.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	50.50
F.o.b. dock, Seattle	50.50
4-in., f.o.b. dock, San Francisco or Los Angeles	53.50
F.o.b. dock, Seattle	53.50

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $41, Birmingham, and $49.50, delivered Chicago; and 4-in. pipe, $44, Birmingham, and $52.40 a ton, delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. x 6 in. and smaller	70
Larger than ½ in.	65 and 10
Lag bolts	65 and 10
Plow bolts, Nos. 1, 2, 3, and 7 heads	65, 10 and 10
Hot-pressed nuts, blank or tapped, square	65 and 10
Hot-pressed nuts, blank or tapped, hexagon	65 and 10
C.p.c and t, square or hex. nuts, blank or tapped	65 and 10
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes	60, 20 and 5
Stove bolts in packages, nuts attached	72½
Stove bolts in packages, with nuts separate	72½ and 5
Stove bolts in bulk	81½

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland.	$3.25
F.o.b. Chicago or Birmingham.	3.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm.	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lbs. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, $55 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.75c.
Delivered, Detroit	2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).	0.70
4600 Nickel Molybdenum (0.20 to 0.30) Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.10c.
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.40
Carbon Vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric turned steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.25c. base per lb. Delivered Detroit, 3.40c.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	...	19.55c.
Bars	24c.	23c.
Plates	28c.	26c.
Structural shapes	...	23c.
Sheets	35c.	33c.
Hot-rolled strip	22¾c.	20¾c.
Cold-rolled strip	29c.	27c.
Drawn wire	...	23c.

Straight Chrome

	No. 410	No 430	No. 442	No. 446
Bars	17c.	18½c.	21c.	26c.
Plates	20c.	21½c.	24c.	29c.
Sheets	25c.	28c.	31c.	35c.
Hot strip	15¾c.	16¾c.	21¾c.	26¾c.
Cold stp.	20½c.	22c.	27c.	35c.

TOOL STEEL

	Base Per Lb.
High speed	60c.
High carbon chrome	39c.
Oil hardening	22c.
Special	20c.
Extra	16½c.
Regular	13c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£9
Billets, open-hearth	£6 to £6 5s.
Tin plate, per base box	£1 11s. 6d.
Steel bars, open-hearth	£8 10s.
Beams, open-hearth	£8 5s.
Channels, open-hearth	£8 10s.
Angles, open-hearth	£8 5s.
Black sheets, No. 24 gage.	£12 7½s.
Galvanized sheets, No. 24 gage	£14 17½s.

CONTINENTAL

Per Metric Ton, Gold £, f.o.b. Continental Ports

Current dollar equivalent is ascertained by multiplying gold pound prices by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£3 4s. 6d.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 15s. 6d.
Sheet bars	£2 15s. 6d.
Plate, ¼ in. and up	£6 14s.
Plate, 3/16 in. and 5 mm.	£5
Sheet, ⅛ in.	£6 5s.
Beams, Thomas	£3 2s. 6d.
Angles (Basic)	£3 2s. 6d.
Hoops and strip, base	£4
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4 pt. No. 10 B.W.G.	£8 15s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH

	Base per Lb.
Plates	3.40c.
Structural shapes	3.40c.
Soft steel bars and small shapes	3.30c.
Reinforcing steel bars	3.30c.
Cold-finished and screw stock:	
Rounds and hexagons	3.80c.
Squares and flats	3.80c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	3.50c.
Hoops	4.00c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.65c.
Galv. sheets (No. 24), 25 or more bundles	4.25c.
Hot-rolled sheets (No. 10)	3.25c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.94
Spikes, large	3.25c.
	Per Cent Off List
Track bolts, all sizes, per 100 count	60
Machine bolts, 100 count	65-5
Carriage bolts, 100 count	65-5
Nuts, all styles, 100 count	65-5
Large rivets, base per 100 lb.	$3.75
Wire, black, soft ann'l'd, base per 100 lb.	3.15c.
Wire, galv. soft, base per 100 lb.	3.55c.
Common wire nails, per keg	2.50c.
Cement coated nails, per keg.	2.50c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.45c.
Soft steel bars, rounds	3.35c.
Soft steel bars, squares and hexagons	3.50c.
Cold-fin. steel bars:	
Rounds and hexagons	3.95c.
Flats and squares	3.95c.
Hot-rolled strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Spikes (keg lots)	4.00c.
Track bolts (keg lots)	5.10c.
Rivets, structural (keg lots)	4.10c.
Rivets, boiler (keg lots)	4.10c.
	Per Cent Off List
Machine bolts	*65
Carriage bolts	*65
Lag screws	*65
Hot-pressed nuts, sq. tap or blank	*65
Hot-pressed nuts, hex. tap or blank	*65
Hex. head cap screws	60
Cut point set screws	75 and 10
Flat head bright wood screws	62 and 20
Spring cotters	55
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade	$4.05
Com. wire nails, 15 kegs or more	2.70c.
Cement c't'd nails, 15 kegs or more	2.70c.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants wihtin the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.65c.
Structural shapes	3.62c.
Soft steel bars, rounds	3.62c.
Iron bars, Swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.22c.
Flats and squares	4.22c.
Cold-rolled: strip, soft and quarter hard	3.57c.
Hoops	3.82c.
Bands	3.82c.
Hot-rolled sheets (No. 10)	3.57c.
Hot-rolled ann'l'd sheets (No. 24*)	4.22c.
Galvanized sheets (No. 24*)	4.82c.
Long terne sheets (No. 24)	5.55c.
Armco iron, galv. (No. 24†)	5.85c.
Toncan iron, galv. (No. 24†)	5.85c.
Galvannealed (No. 24†)	5.95c.
Armco iron, hot-rolled annealed (No. 24†)	5.30c.
Toncan iron, hot-rolled annealed (No. 24†)	5.30c.
Armco iron hot-rolled (No. 10†)	4.35c.
Toncan iron, hot-rolled (No. 10†)	4.35c.
Cold-rolled sheets (No. 20) less than 1000 lbs.	
Standard quality	4.85c.
Deep drawing	5.50c.
Stretcher leveled	5.50c.
SAE, 2300, hot-rolled	7.32c.
SAE, 3100, hot-rolled	5.72c.
SAE, 6100 hot-rolled, annealed	9.92c.
SAE, 2300, cold-rolled	8.30c.
SAE, 3100, cold-rolled, annealed	7.75c.
Floor plate, ⅛ in. and heavier	5.45c.
Standard tool steel	11.75c.
Wire, black, annealed (No. 9)	3.60c.
Wire, galv. (No. 9)	3.85c.
Tire steel, 1 x ½ in. and larger	4.11c.
Open-hearth spring steel	4.15c. to 10.15c.
Common wire nails, base per keg	$3.70
	Per Cent Off List
Machine bolts, square head and nut:	
All diameters	65
Carriage bolts, cut thread:	
All diameters	65

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.69c.
Bars, soft steel (rounds and flats)	3.59c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.74c.
Cold-fin. rounds, shafting, screw stock	4.19c.
Hot-rolled annealed sheets (No. 24)	4.29c.
Galv. sheets (No. 24)	4.89c.
Hot-rolled sheets (No. 10)	3.59c.
Black corrug. sheets (No. 24)	4.29c.
½ Galv. corrug. sheets	4.89c.
Structural rivets	4.44c.
Boiler rivets	4.44c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	65

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.30c.
*Structural shapes	3.30c.
*Soft steel bars, small shapes, iron bars (except bands)	3.45c.
‡Reinforc. steel bars, sq. twisted and deformed	3.21c.
Cold-finished steel bars	4.18c.
*Steel hoops	3.80c.
*Steel bands, No. 12 and 3/16 in. incl.	3.55c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	4.15c.
†Galvanized sheets (No. 24)	4.80c.
*Hot-rolled annealed sheets (No. 10)	3.40c.
Diam. pat. floor plates, ¼ in.	5.25c.
Swedish iron bars	6.25c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.56c.
Soft steel bars	3.25c.
‡Reinforc. steel bars	3.25c.
†Cold-finished steel bars	3.95c.
Flat-rolled steel under ¼ in.	3.66c.
Cold-finished strip	†3.25c.
Hot-rolled annealed sheets (No. 24)	4.31c.
Galvanized sheets (No. 24)	4.91c.
Hot-rolled sheets (No. 10)	3.41c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.66c.
*Black ann'l'd wire, per 100 lb.	$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg.	2.45c.
	Per Cent Off List
Machine and carriage bolts, small	70
Large	65 and 10
Nuts, 100 count	65

†Outside delivery 10c. less.
*For 5000 lb. or less.
‡Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.65c.
Floor plates	5.40c.
Bars, rounds, flats and angles.	3.55c.
Other shapes	3.70c.
Rail steel reinforc. bars	3.40c.
Hoops and bands, 3/16 in. and lighter	3.75c.
Cold-finished bars	4.15c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.05c.
Galv. sheets (No. 24) 3750 lb. or more	4.07c.
Galvanized sheets (No. 24) over 3500 lb.	4.65c.
Hot-rolled sheets (No. 10)	3.50c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload.	3.04
Cement c't'd nails, base 100-lb keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

	Base per Lb.
Plates	3.62c.
Struc. shapes	3.50c.
Soft steel bars	3.40c.
Reinforcing bars	2.75c.
Cold-fin. flats and sq.	4.00c.
Rounds and hex.	4.00c.
Cold-rolled strip steel	3.44c.
Hot-rolled annealed sheets (No. 24)	4.46c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.72c.
Galv. sheet (No. 24)	5.00c.
Bands	3.72c.
Hoops	3.72c.
Heavy top-rolled sheets	3.47c.
Com. wire nails, base per keg.	$3.00
Black wire, base per 100 lb. (2500-lb. lots or under)	4.10c.
(Over 2500 lb.)	4.00c.

BOSTON

	Base per Lb.
Channels, angles	3.75c.
Tees and zees, under 3"	4.00c.
H beams and shapes	3.77c.
Plates — Sheared, tank, and univ. mill, ¼ in. thick and heavier	3.78c.
Floor plates, diamond pattern	5.58c.
Bar and bar shapes (mild steel)	3.75c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.90c. to 4.90c.
Half rounds, half ovals, ovals and bevels	5.00c.
Tire steel	5.00c.
Cold-rolled strip steel	3.495c.
Cold-finished rounds, squares and hexagons	4.30c.
Cold-finished flats	4.30c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	4.80c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.44c.
Structural shapes	3.65c.
Plates	3.65c.
Floor plates	5.40c.
Hot-rolled annealed sheets (No. 24)*	4.34c.
Hot-rolled sheets (No. 10)	3.44c.
Galvanized sheets (No. 24)**	5.00c.
Bands and hoops	3.69c.
†Cold-finished bars	4.04c.
Cold-rolled strip	3.43c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.79c.
Bolts and nuts, in cases, 65 per cent off list	
Broken cases	60 per cent off

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

* Under 400 lb., .50c. over base; 400 to 3499 lb., base; 3500 lb. and over, base less .25c.

** Under 400 lb., .50c. over base; 400 to 1499 lb., base; 1500 to 3749 lb., base less .20c.; 3750 to 7499 lb., less .40c.; 7500 lb. and over, less .60c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Common wire nails, base per keg	$2.75

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

Base per Lb.

Plates and structural shapes	3.56c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.46c.
Soft steel bars, squares and hexagons	3.61c.
Hot-rolled strip	3.71c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 24)	4.76c.
Cold-finished steel bars	4.06c.
Structural rivets (keg lots)	4.21c.
Boiler rivets, cone head (keg lots)	4.21c.
Track spikes (keg lots)	4.11c.
Track bolts (keg lots)	5.21c.
Black annealed wire (No. 14 and heavier)	4.16c.
Com. wire nails and cement coated nails 15 kegs and over	2.81c.

Per Cent Off List

Machine bolts and carriage bolts, ½x6 and smaller	65
Larger	65
Coach and lag screws	65
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	65

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

Base per Lb.

Mild steel bars, rounds	3.60c.
Structural shapes	3.70c.
Plates	3.70c.
Cold-finished bars	4.42c.
Hot-rolled annealed sheets, No. 24	4.30c.
Galvanized sheets, No. 24	4.90c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

Base per Lb.

Mild steel bars and small shapes	3.50c.
Structural shapes	3.60c.
Reinforcing bars	....prices on application
Plates	3.60c.
Hot-rolled sheets, No. 10	3.45c.
Bands	3.50c.
Hoops	3.75c.
Special threading steel	3.60c.
Diamond pattern floor plates ¼ in. and heavier	5.60c.
Galvanized bars, bands and small shapes	6.00c.
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	4.15c.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

Base per Lb.

Mild steel bars	3.71c.
Iron bars	3.71c.
Reinforcing bars	3.71c.
Structural shapes	3.81c.
Plates	3.81c.
Hot-rolled sheets No. 10	3.66c.
Hot-rolled annealed sheets, No. 24*	3.56c.
Galvanized sheets No. 24*	4.16c.
Steel bands	3.91c.
Cold-finished bars	4.51c.

* Plus mill item extra.

MEMPHIS

Base per Lb.

Mild steel bars	3.81c.
Shapes, bar size	3.81c.
Iron bars	3.81c.
Structural shapes	3.91c.
Plates	3.91c.
Hot-rolled sheets, No. 10	3.76c.
Hot-rolled annealed sheets, No. 24	4.66c.
Galvanized sheets, No. 24	5.26c.
Steel bands	4.01c.
Cold-drawn rounds	4.45c.
Cold-drawn flats, squares, hexagons	6.45c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	60
Small rivets, per cent off list	50

NEW ORLEANS

Base per Lb.

Mild steel bars	3.70c.
Reinforcing bars	3.50c.
Structural shapes	3.80c.
Plates	3.80c.
Hot-rolled sheets, No. 10	3.85c.
Hot-rolled annealed sheets, No. 24	4.55c.
Galvanized sheets, No. 24	5.10c.
Steel bands	4.25c.
Cold-finished steel bars	4.75c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$2.80
Bolts and nuts, per cent off list	70-10

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.75c.	4.00c.	3.95c.
Shapes, standard	3.75c.	4.00c.	3.95c.
Soft steel bars	3.85c.	4.00c.	4.10c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.725c.	2.725c.	3.725c.
Hot-rolled annealed sheets (No. 24)	4.65c.	4.60c.	4.85c.
Hot-rolled sheets (No. 10)	3.95c.	4.15c.	4.10c.
Galv. sheets (No. 24 and lighter)	5.25c.	5.05c.	5.35c.
Galv. sheets (No. 22 and heavier)	5.50c.	5.20c.	5.35c.
Cold finished steel			
Rounds	6.30c.	6.35c.	6.60c.
Squares and hexagons	7.55c.	7.60c.	6.60c.
Flats	8.05c.	8.10c.	7.60c.
Common wire nails—base per keg less carload	$3.10	$3.05	$3.10

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

High-heat duty, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$48.00
High-heat duty, New Jersey	58.00
High-heat duty, Ohio	43.00
Intermediate, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	43.00
Intermediate, New Jersey	46.00
No. 1, Ohio	40.00
Ground fire clay, per ton	7.00

5 per cent trade discount on fire clay brick.

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$48.00
Chicago District	57.00
Birmingham	48.00
Silica cement per net ton	8.50

5 per cent trade discount on silica brick.

Chrome Brick

Per Net Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

Per Net Ton

Standard f.o.b. Baltimore and Chester, Pa.	$67.00
Chemically bonded, f.o.b. Baltimore	57.00

Grain Magnesite

Per Net Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	42.00
Domestic, f.o.b. Chewelah, Wash.	24.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro, and Swedeland, Pa., and Sparrows Point, Md.	23.00
Delivered Brooklyn	25.27
Delivered Newark or Jersey City	24.39
Delivered Philadelphia	23.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	22.00
F.o.b. Jackson, Ohio	23.75
Delivered Cincinnati	22.07
F.o.b. Duluth	22.50
F.o.b. Provo, Utah	18.50
Delivered San Francisco, Los Angeles or Seattle	23.00
F.o.b. Birmingham*	18.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of .70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	22.50
F.o.b. Buffalo	21.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill	21.50
Delivered Cincinnati	22.01
Delivered Canton, Ohio	22.76
Delivered Mansfield, Ohio	23.26
F.o.b. Jackson, Ohio	23.25
F.o.b. Provo, Utah	18.00
F.o.b. Birmingham	17.00

Bessemer

F.o.b. Everett, Mass.	$23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	24.00
Delivered Boston Switching District	24.50
Delivered Newark or Jersey City	25.39
Delivered Philadelphia	24.76
F.o.b. Buffalo and Erie, Pa., and Duluth	23.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	22.50
F.o.b. Birmingham	23.50
Delivered Cincinnati	23.51
Delivered Canton, Ohio	23.76
Delivered Mansfield, Ohio	24.26

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$24.50
Delivered Chicago	27.54

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.25	20.50
Malleable	21.00
Basic	20.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$80.00
Spiegeleisen	
Per Gross Ton Furnace	
Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 6.00 to 6.50%	$24.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$29.50
10.51 to 11.00%	30.00
11.00 to 11.50%	30.50
11.51 to 12.00%	31.00
12.01 to 12.50%	31.50
12.51 to 13.00%	32.00
13.01 to 13.50%	32.50
13.51 to 14.00%	33.00
14.01 to 14.50%	33.50
14.51 to 15.00%	34.00
15.01 to 15.50%	34.50
15.51 to 16.00%	35.00
16.01 to 16.50%	35.50
16.51 to 17.00%	36.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.30
Ferrotungsten, lots of 5000 lb.	1.35
Ferrotungsten, smaller lots	1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	142.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	58.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	75.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$38.00
Ton lots or less, per ton	43.00
Silico-manganese, gross ton, delivered.	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00

Note: Spot prices are $5 a ton higher except on 75 per cent ferrosilicon on which premium is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$4.80
Old range, non-Bessemer, 51.50%	4.65
Mesabi, Bessemer, 51.50%	4.65
Mesabi, non-Bessemer, 51.50%	4.50
High phosphorus, 51.50%	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	13.50c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	10.00c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	34c.
Man., African, Indian, 44-48%	25c to 30c.
Man., African, Indian, 49-51%	30c.
Man., Brazilian, 46 to 48½%	Nominal..25c. to 30c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal	$15.25 to $15.50
Tungsten, domestic, scheelite delivered, nominal	15.00

Chrome ore (lump) c.i.f. Atlantic Seaboard, per net ton:

South African	$16.00
Rhodesian, 45%	23.00
Rhodesian, 48%	25.00
Turkish, 48-49%	22.00 to $22.50
Turkish, 45-46%	20.00 to 20.50
Turkish, 44%	18.00

Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:

52%	$25.00 to $25.50
50%	24.00
48-49%	22.00 to 22.50

FLUORSPAR *Per Net Ton*

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$18.00
Domestic, barge and rail	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL *Per Gal.*

F.o.b. Bayonne or Baltimore No. 3 distillate	4.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	3.75c.
Del'd Ch'go, No. 3 industrial	4.25c.
Del'd Ch'go, No. 5 industrial	3.90c.
Del'd Cleve'd, No. 3 distillate	6.00c.
Del'd Cleve'd No. 4 industrial	5.75c.
Del'd Cleve'd No. 5 industrial	5.00c.

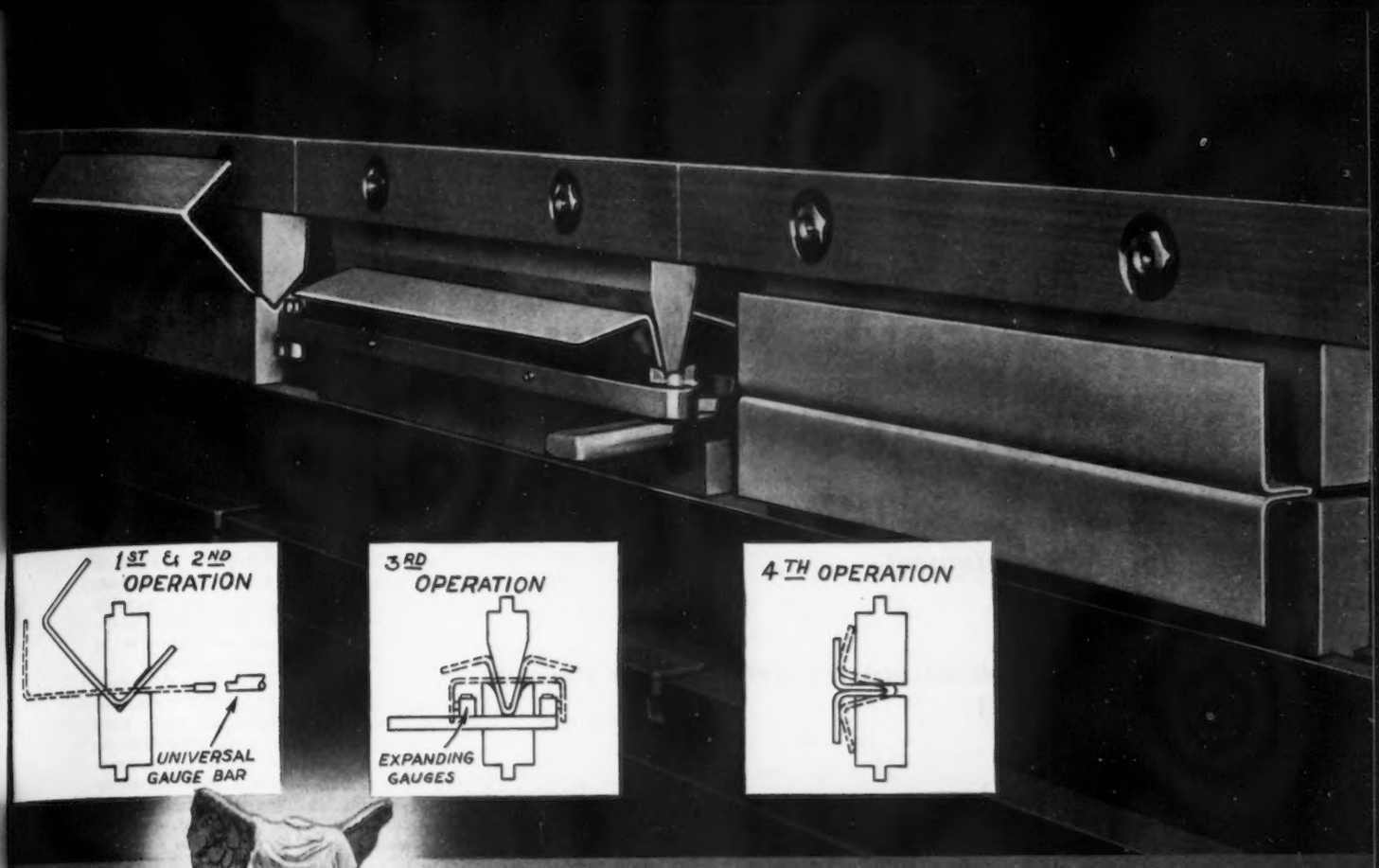
COKE AND COAL

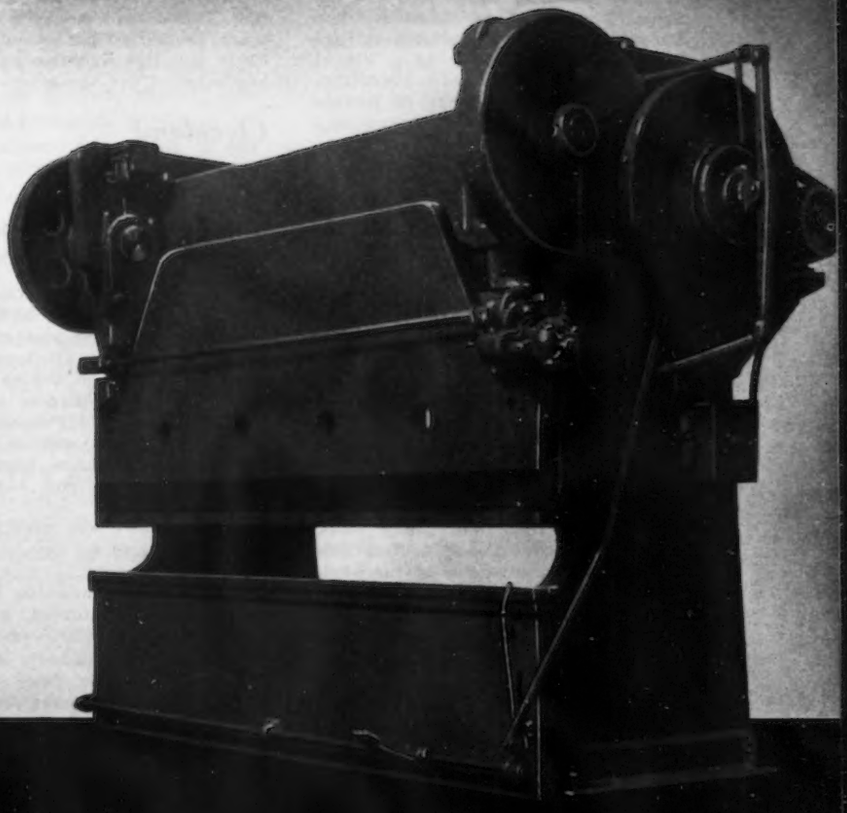
Coke *Per Net Ton*

Furnace, f.o.b. Connellsville, Prompt	$4.25 to $4.35
Foundry, f.o.b. Connellsville, Prompt	4.50 to 5.80
Foundry, by-product, Chicago ovens	9.00
Foundry, by-product, del'd New England	12.00
Foundry, by-product, del'd Newark or Jersey City	9.60 to 10.05
Foundry, by-product, Philadelphia	9.85
Foundry, by-product, delivered Cleveland	10.25
Foundry, by-product, delivered Cincinnati	9.75
Foundry, Birmingham	6.50
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.76

Coal *Per Net Ton*

Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45





Progressive forming accomplishes on one machine what otherwise would require several brakes or separate set-ups on the same brake • • • Cincinnati Press Brakes form each bend accurately, even with a different pressure on each die. • • • • • • • • • • • • •

THE CINCINNATI SHAPER COMPANY
CINCINNATI, OHIO

SHAPERS • SHEARS • BRAKES

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . Milwaukee and Santa Fe railroads place orders for shop equipment.

o o o

. . . Cincinnati plants are recovering from damage done by flood.

o o o

. . . Sales are lighter in some sections, but demand generally is fairly good.

Chicago

NEW price lists and deferred deliveries are the reasons given by dealers for a market in which sales curves have been almost level for a number of weeks. The Milwaukee Road has placed orders for about $200,000 worth of equipment, and the Santa Fe has about closed its list. Farm implement manufacturers are buying individual items on a liberal basis. Most machine tool manufacturers have sizable bookings of foreign orders.

Cincinnati

FLOOD memories are rapidly fading in the steadily improving machine tool market. Several plants, however, are still in the process of rehabilitation from high waters, but the complete return of all factories to operation commensurate with current demand is a matter of only a short time. Business is increasing steadily and warrants near to full capacity operation. Bookings include a number of multiple-unit orders from foreign sources for millers, grinders and lathes, but amounts are undisclosed. Domestic users are active in the market for both light and heavy tools. Planers, boring mills and drilling machinery are almost apace of the brisk market.

Production, however, is being retarded by scarcity of skilled labor. Employers are selecting tool hands with care to insure steady, uninterrupted operation.

Pittsburgh

INQUIRIES have picked up in the past week. One fair-sized request for data involved seven machines and is a call for revision of quotations given some time ago. Orders are about on a par with a week ago, but the pick-up in inquiries presages an improvement in orders in the near future. It is felt by some dealers that total February sales will compare favorably with those made in recent months. Deliveries are getting further behind, and, in view of the intense pressure from customers, it is likely that this situation will show no improvement for some time.

Cleveland

MACHINE tool sales continue rather light, although some dealers report a little improvement over early in the month. Orders are confined to single machines and are coming from diversified industries. No sizable inquiries are pending. Deliveries by some manufacturers have become slightly easier. The present inactivity in the market is attributed by the trade to the heavy buying that preceded the price advances around the first of the year. Placing of many orders that came out at that time probably would have been deferred until later had it not been for the advance.

New York

THE volume of incoming business is being well maintained, with buyers anxious to secure places upon the production lists for as early delivery as possible. Inquiries from the Pennsylvania and New Haven railroads are reported. Sales in this district consist mostly of orders for one and two machines, although of late there have been sales of five, six and seven machines in single lots, with one seller reporting an order from a New England buyer for 12 units, with the possibility of further business from that source likely. Export buying has shown no decline.

Detroit

INQUIRIES on large programs both at General Motors and Chrysler plants featured the machinery market this week, although it is not expected that there will be any imporant closures until the labor situation is better stabilized. Chrysler's chief machinery activity is being centered at the Jefferson Avenue plant, but it is not expected that orders will materialize until the present demands of the UAW for sole bargaining representation are definitely out of the way. Meanwhile plans for making Chrysler engines in Canada are being broadened to include practically every machining operation on the block and component parts. Ford Motor Co. also continues to be an active factor in the market.

As a result of wage demands made upon local tool and cutter shops, the prices of standard small tools have gone up. Recent price increases on standard machine tools have practically eliminated the jobbing shops as buying factors in the market, particularly since the tool and die program for 1938 models is expected to be small. In fact, most of the machinery purchases being lined up today in the corporation shops are for expansion of capacity rather than to take care of mechanical changes.

Indian Steel Plants to Expand

LONDON *(Special Correspondence).*—The negotiations that have been proceeding for more than a year between the Tata Iron & Steel Co. and the Indian Iron & Steel Co. for amalgamating the two companies have now completely broken down.

The Indian company is now making arrangements for the formation of a new steel company with the object of erecting a steel plant adjacent to its existing iron works at Hirapur. The new plant will have an initial output capacity of 200,000 tons annually of finished steel.

The Tata company is preparing a plan to expand its Jamshedpur works with a view to increasing the annual output.

The National Association of Fan Manufacturers has designed a label to appear on all printed matter to show that fans and blowers sold by member companies have certified ratings based on the "Standard Test Code for Dick and Propeller Fans, Centrifugal Fans and Blowers," which has been approved by the Federal Trade Commission.

Heat Effect in Welding

(CONTINUED FROM PAGE 31)

about by the mass cooling effect of the surrounding plate metal. So with the exception of austenite, the low alloy steels can be made to assume the structural make-up of the microscopic constituents from pearlite to martensite with the corresponding hardness of each class. It is possible to produce the entire range of these structures in the plate metal by the welding process.

With increased hardening power of the base metal in combination with special elements, it then becomes easier to produce hardened areas alongside the weld in alloy steels. This may be kept to a minimum by keeping the carbon content low and thereby avoiding the danger and cost of shop cracks and the inability of this affected area to absorb impact in service where changing physical properties are encountered in a welded section.

Chromium-Molybdenum Steels

Two grades of this type of steel were studied by means of hardness testing and microscopic examination: namely, S.A.E. Nos. 4130 and 4150. They differed mainly in carbon content although the latter is also slightly higher in chromium.

As stated in the previous paper, a figure of 100 points Vickers-Brinell was arbitrarily selected as the maximum allowance between the unaffected plate and hard zone for the greatest welding speed for each steel. On the basis of the same hardness variation, this figure also suggests the minimum heat energy input for each grade of steel. The heat energy input is derived from the amperage, voltage and welding speed values as described in the first paper.

S.A.E. 4130 — 0.33 per cent carbon, chromium-molybdenum. Hardness curve Fig. 17; photomicrographs. Fig. 18 — 1.0 per cent Nital etch.

This steel welded very easily through the entire range of welding speeds. The curves, Fig. 17, up to 12 in. a minute welding speed show a gradual increase in hardness with increasing welding speed. The maximum allowable speed for this steel on the basis of 100 points Vickers-Brinell is 13 in. a minute. However, at the 12 in. rate the difference in hardness between hard zone, weld and plate is only 60 points. As a matter of fact, it seems reasonable to expect that if speeds between 12 and 18 in. had been used, the hard zone curve might have shown that a sudden increase in hardness takes place close to the 18-in. speed and that the allowable figure would be nearer 18 in. than it is now to the 12-in. speed.

The slight increase in hardness in the hard zone from 4 to 12 in. a minute is worthy of comment and should give rise to consideration of this type of steel for welding purposes. It might almost be thought of as unhardenable up to a welding speed of 12 in. If we had limited the hardness variation to 60 points Vickers-Brinell, the use of some grades of special steels would have been restricted to the slowest welding speeds. A wide range of welding conditions can be safely predicted for this steel.

The photomicrographs in Fig. 18 reveal the characteristically striated structure of molybdenum bearing steels, especially in the slower welding speeds. Up to and including the 8-in. illustration, only sorbite of increasing fineness is present; troostite appears in the 12-in. view and at the 18-in. speed martensite shows up, as is consistent with the 465 Vickers-Brinell hardness of this specimen. If the carbon content is lowered to even less than 0.33 per cent, say about 0.20 per cent, such a steel would be almost immune to appreciable hardening of the metal adjacent to the weld.

S.A.E. 4150 — 0.52 per cent carbon, chromium-molybdenum. Hardness curve Fig. 19; photomicrographs Fig. 20 — 1.0 per cent Nital etch. Individual hardness curve for the 18 in. specimen, Fig. 21.

The hardness curve, Fig. 19, indicates the air hardening properties of this type of alloy steel. The limiting welding speed is greatly reduced over that of the S.A.E. 4130. In this grade of steel too much stress cannot be placed upon the hardness of the weld, since a plain carbon steel electrode was employed. Ordinarily a wire of similar composition to that of the base metal would be used. However, the interest of our investigation is centered around the plate metal only, so for the object sought, the weld hardness is not so important.

The sudden increase in hardness from 335 to 642 Vickers-Brinell limits welding to the lower speeds. Here is another and very startling example of the effect of carbon on the metal adjacent to the weld. This steel produced the greatest hardness value and the highest order of the structural constituents; it is completely martensite over a distance of at least 0.08 in. from the fusion line into the plate.

As shown in Fig. 20, troostite is present together with sorbite in the first three views. The last two are completely martensitic below the weld. Since there is a high hardness to begin with, the effect of stress relief, to be described later, is very marked.

Fig. 21 shows the hardness curves as plotted on the individual specimen which had been welded at 18 in. a minute. The Vickers-Brinell impressions are 9.02 in. apart through the hardened zone. Line *A* of indentations was run across the face of the sample touching the base of the weld. Line *B* is 0.06 in. below the top surface of the specimen and line *C* passes vertically through the weld, hard zone and plate. The hardness values for any indentation may be found by tracing that point to the corresponding position on the curve for that line, as seen on curves *A'*, *B'* and *C'*. This also serves as an illustration of the manner in which the hardness curves were plotted, for example Fig. 19. The points plotted for the 18-in. welding speed were as follows: Hard zone, 642 Vickers-Brinell; weld, 455 Vickers-Brinell, and unaffected plate, 287 Vickers-Brinell. These figures were obtained from the curves on Fig. 21.

(TO BE CONCLUDED)

March 4, p 48

PLANT EXPANSION AND EQUIPMENT BUYING

. . . Viscose Co., New York, has plans for a new mill near Front Royal, Va., costing $2,500,000 with equipment.

o o o

. . . North American Aviation Co., Los Angeles, has awarded contract for an addition to cost $250,000 complete.

o o o

. . . Pfaudler Co., Rochester, N. Y., glass lined enameled steel tanks, plans an expenditure of $500,000 for an addition and equipment.

NORTH ATLANTIC

National Carbon Co., Inc., 30 East Forty-second Street, New York, manufacturer of electric batteries, electrodes, welding carbons, etc., has let general contract to Gillmore-Carmichael-Olson Co., 1873 East Fifty-fifth Street, Cleveland, for new plant near Columbia, Tenn., where about 175 acres recently was acquired. Main units will be one-story, 130 x 330 ft., and 100 x 400 ft., supplemented with several smaller buildings. Cost over $150,000 with equipment. Company also has let general contract to same company for two-story plant unit, 40 x 100 ft., at Fostoria, Ohio. Cost close to $50,000 with equipment.

Simmons Machine Tool Corp., Albany, N. Y., has acquired works of Capital District Foundry & Machine Corp., Green Island, N. Y., for new branch plant. Improvements will be made and additional equipment installed. George H. Long, Jr., is vice-president.

Metallizing Engineering Co., Inc., 44 Whitehall Street, New York, affiliated with Metallizing Co. of America, Inc., same address, has leased one-story building at 35-47 Thirty-sixth Street, Long Island City, for storage, distribution and laboratory.

Sinclair Refining Co., 630 Fifth Avenue, New York, has filed plans for extensions in bulk oil storage and distributing plant at Linden, N. J., comprising four new steel tank units, each with capacity of 93,000 bbl., and auxiliary equipment. Cost about $100,000.

Continental Can Co., 1 Pershing Square, New York, has plans for one-story addition to branch plant at Jersey City. Cost over $65,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 5 for nozzle rings for turbines (Schedule 1) for Brooklyn Navy Yard; until March 9, refrigeration equipment, spare parts and tools (Schedule 16) for Brooklyn and Philadelphia yards.

Viscose Co., 200 Madison Avenue, New York, has plans for new mill on about 260 acres near Front Royal, Va., recently acquired, with power house, pumping station, machine shop and other structures. It will be equipped for ultimate employment of about 4000 persons. Structural steel awards have been made to Bethlehem Steel Co. and Belmont Iron Works. Cost over $2,500,000 with machinery. New mill will be operated by Viscose Corp. of Virginia, Inc., Roanoke, a subsidiary, with plant at last noted place.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until March 9 for 63,000 ft. of telephone cable, 4500 ft. of cable, and 20 reels (Circular 126).

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until March 3 for lighted steel buoys (Proposal 53132), steel buoys (Proposal 53133).

Art Tube Co., 8 Renee Place, Irvington, N. J., manufacturer of collapsible metal tubing, etc., has asked bids on general contract for one-story and basement plant, 145 x 150 ft., at Lyons Avenue and Cordier Street. Cost close to $100,000 with equipment. John T. Simpson, 744 Broad Street, Newark, is architect.

C. E. Van Winckel Co., 75 Paris Street, Newark, N. J., manufacturer of industrial chemicals, etc., has leased one-story factory at Linden, N. J., for plant.

State Purchase Commissioner, State House, West State Street, Trenton, N. J., asks bids until March 1 for cast iron posts.

General Insulating & Mfg. Co., Fairview Avenue, Alexandria, Ind., plans new branch plant at Dover, N. J., where property is being secured. Cost close to $60,000 with equipment.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until March 1 for steel bolts, steel engine bolts, steel nuts, steel clevis nuts, hexagon nuts, anchor stop nuts, steel engine screws, brazier head screws, flathead screws and plain washers (Aero Req. 1086), universal joints (S. & A. Req. 6583), 500 sets of ignition wire markers (Aero Req. 502-1082); also for bids (no closing date stated) for chrome molybdenum steel tubing, chrome-nickel corrosion and heat-resisting steel tubing (Aero Req. 983).

Resinous Products & Chemical Co., 222 West Washington Square, Philadelphia, has let general contract to Frank V. Warren, Inc., Fifteenth and Locust Streets, for four-story plant. Cost close to $100,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until March 2 for high-speed straight shank drills (Circular 446), carbon steel flat drills (Circular 448).

BUFFALO DISTRICT

Pfaudler Co., 89 East Avenue, Rochester, N. Y., manufacturer of glass-lined enameled steel tanks, kettles and kindred vessels, has let general contract to A. W. Hopeman & Sons Co., 569 Lyell Avenue, for one-story addition, 250 x 500 ft. Cost close to $400,000 with equipment. Gordon & Kaelber, 311 Alexander Street, are architects.

Coca-Cola Bottling Co., 369 East Ferry Street, Buffalo, has let general contract to Crooker, Carpenter & Skaer, Inc., 120 Hardwood Place, for one-story addition, 60 x 125 ft., in part for storage and distribution. Cost about $50,000 with equipment.

State Department of Mental Hygiene, State Office Building, Albany, N. Y., plans one-story industrial shop at Buffalo, with equipment storage and distributing facilities. Cost over $150,000 with equipment.

NEW ENGLAND

Himmel Brothers, 200 Commerce Street, New Haven, Conn., manufacturer of metal store fronts, fixtures, etc., has let general contract to Jacob Albert, 136 Sherman Avenue, for new two-story plant, 150 x 200 ft., with one-story wing, 30 x 100 ft., for office service, at Hamden, Conn. Cost about $100,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, is architect and engineer.

Grasselli Chemical Co., Inc., 140 Federal Street, Boston, plans rebuilding part of storage and distributing plant at South Boston, recently destroyed by fire. Loss over $75,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until March 15 for one electric-operated brazing furnace with 4-in. muffle (Circular 155), one hobbing machine with long spline shaft (Circular 158).

Cremo Brewing Co., New Britain, Conn., plans one and multi-story addition for expansion in mechanical-bottling and other departments. Work will begin in spring. Cost over $50,000 with equipment.

Jiffy Mfg. Co., 45 Washington Street North, Boston, manufacturer of insulated bags and containers, insulated box liners, etc., has leased, with option to purchase, former plant of Phineas Jones Co., Hillside, near Newark, N. J. Property comprises about five acres, improved with one-story buildings totaling 35,000 sq. ft. floor space. Structures will be remodeled and new equipment installed.

SOUTH CENTRAL

Hedges-Walsh-Weidner Co., South Grove Street, Chattanooga, Tenn., manufacturer of boilers, tanks and kindred plate products, plans one-story addition to boiler shop, 90 x 200 ft., and improvements in present plant. Cranes, hoists and other equipment will be installed. Cost about $150,000 with equipment. Company is a subsidiary of Combustion Engineering Co., New York.

A. B. Blanton Distillery Co., Frankfort, Ky., has let general contract to Frank Messer & Sons, Inc., 2515 Burnet Avenue, Cincinnati, for one and two-story additions, including main two-story unit, 32 x 50 ft., with remodeling and improving existing buildings. Cost over $65,000 with equipment. Carl J. Kiefer Associates, Inc., Schmidt Building, Cincinnati, is consulting engineer. Company is a division of Schenley Products Co., New York.

United States Engineer Office, Vicksburg, Miss., asks bids until March 5 for one cast steel pump shell, one cast steel basket cutter and one cast steel impeller (Circular 178).

Cotton Brothers Baking Co., Baton Rouge, La., plans new one-story plant at Jackson, Miss., with traveling ovens, mixers, conveyers and other mechanical-handling equipment. Cost close to $90,000 with machinery.

Swift & Co., Chicago, and 62 Congress Street, Montgomery, Ala., meat packers, have plans for new four-story plant at North Montgomery. Cost about $80,000 with equipment.

Richmond Water Commission, Lexington, Ky., J. W. Hamilton, chairman, asks bids until March 11 for addition to waterworks station, including new pumping machinery, purification equipment and 500,000-gal. elevated steel tank and tower. J. S. Watkins, Citizens' Bank Building, is consulting engineer.

WASHINGTON DIST.

Purchasing Officer, Department of Interior, Washington, asks bids until March 1 for woodworking machinery (Proposal 2203), one motor-driven shaper, one planer and jointer, one surfacer, and one saw and dado (Proposal 2210) for Luray, Va.

General Purchasing Officer, Panama Canal, Washington, asks bids until March 2 for 36 metal-cutting band saws, two steel acetylene and three oxygen cylinders, hand reamers, compound pressure and vacuum

gages, sliding head screw clamps, toggle switches, copper magnet wire, steel wire cleaning brushes, metallic electrode holders, steel wool, hacksaw frames, nail hammers and other tools and supplies (Schedule 3227); until March 4, 24 dipper tooth points, 500 10-gal. steel paint drums, barrel bolts, steel hasps and staples, dredge chain, coil chain, chain links, sledge hammer handles and other equipment (Schedule 3225).

Rustless Iron & Steel Corp., 1001 Edison Highway, Baltimore, has asked bids on general contract for one-story addition. Cost over $50,000 exclusive of equipment. H. A. Brassert, 310 South Michigan Avenue, Chicago, is consulting engineer.

Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until March 11 for three welded steel jacketed reactors (Circular 98).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 2 for cast bronze liners (Schedule 6) for Washington yard; electric power equipment (Schedule 1030) for Norfolk, Va., Navy Yard; 1000 aircraft manifold pressure gages (Schedule 1035) for Philadelphia yard; until March 5, 10 floor-type double emery grinders (Schedule 1046) for Norfolk, San Pedro and Puget Sound yards; gears and shafts for airplanes (Schedule 900-574), plate assemblies for airplanes (Schedule 900-576), motor-driven oil pumps (Schedule 9950) for Eastern and Western yards; six 150-hp. marine diesel engines (Schedule 1040) for Norfolk and Puget Sound yards; 12 motors for high-pressure air compressors, 12 field rheostats and spare parts (Schedule 21) for Portsmouth yard; until March 9, aluminum alloy tubing (Schedule 1043) for Eastern and Western yards.

SOUTH ATLANTIC

Southern Cooperative Foundry Co., North Broad Street, Rome, Ga., manufacturer of stoves, ranges and parts, has asked bids on general contract for one-story addition. 65 x 140 ft. Cost close to $50,000 with equipment.

Commanding Officer, Ordnance Department, Fort Benning, Ga., asks bids until March 6 for one 50 cu. ft. per min. air compressor (Circular 1), three floor-type lathes and one gap lathe (Circular 2), lubricating equipment, including one barrel pump, air hose, lubricating hose, hand guns, oil guns, spring oilers and pistol oilers (Circular 3).

Armour & Co., Union Stock Yards, Chicago, have acquired property on East Fifth Street at Charlotte, N. C., for new branch plant, with storage and distributing buildings. Cost close to $175,000 with equipment.

District Quartermaster, Fort Barrancas, Fla., asks bids until March 12 for four steel tank and tower units (Proposal 5401-64).

WESTERN PA. DIST.

H. J. Heinz, Co., 1062 Progress Street, Northside, Pittsburgh, canner and packer of food products, has acquired 25-acre tract at Fremont, Ohio, in part as site for new branch plant, with power house, machine shop and other mechanical departments. Cost over $100,000 with equipment.

Ellwood City Forge Co., Ellwood City, Pa., manufacturer of shafting, connecting rods and kindred products, has acquired crankshaft department of Union Drawn Steel Co., Beaver Falls, Pa., and will operate as branch plant.

Pennsylvania Electrical Repair Co., 129 First Avenue, Pittsburgh, has asked bids on general contract for one and two-story plant, 170 x 175 ft., at 1001-15 Saw Mill Run Boulevard, where site was purchased recently. Cost close to $75,000 with equipment. Paul R. Scheuneman, Magee Building, is architect.

OHIO AND INDIANA

Ferry Machine Co., Kent, Ohio, manufacturer of machinery and parts, has plans for one-story addition, 40 x 170 ft. Cost close to $50,000 with equipment. C. G. Kistler, 105 East Main Street, is architect.

Parsons Engineering Corp., 6511 Cedar Avenue, Cleveland, manufacturer of ventilating equipment and dust-removing machinery, has leased building at 3899 East Eighty-second Street, about 12,000 sq. ft. floor space, for plant, removing present works to new location and installing additional equipment.

Light Alloys Co., Painesville, Ohio, manufacturer of aluminum castings and allied products, has plans for rebuilding one-story plant, 60 x 200 ft., recently damaged by fire, with loss of about $50,000 including equipment.

Coca-Cola Bottling Works Co., 520 East Fifth Street, Cincinnati, has plans for new plant on four-acre tract near Dana and Woodburn Avenues, fronting on line of Norfolk & Western Railway, recently acquired, for mechanical-bottling, storage and distribution, and general operations. Cost over $85,000 with equipment. John H. Deekin, 800 Broadway, is architect.

Friedman Brothers & Co., 10309 Harvard Avenue, S.E., Cleveland, steel merchants, have purchased for expansion former local plant of Connelly Boiler Co., comprising about six acres, improved with three main one-story buildings, totaling close to 70,000 sq. ft. floor space, power house and office building.

Darling & Co., Valley and Jennings Roads, Cleveland, manufacturers of commercial fertilizers and allied products, will take bids at once on general contract for one-story addition, comprising three sections, 66 x 70 ft., 48 x 70 ft., and 36 x 48 ft., with foundations for additional story later. Improvements will be made also in power house, with installation of boiler unit, stoker and auxiliary equipment. Cost about $70,000 with equipment. Archibald N. Ferguson, 12829 Speedway Overlook, is architect. Company headquarters are at Chicago.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until March 1 for 4175 self-locking padlocks (Circular 526); until March 2, universal joints for aircraft (Circular 529); until March 5, nozzle assemblies, adapter assemblies, screen assemblies, and servicing pump suction pipe ends (Circular 540); until March 8, 160,000 palnuts (Circular 541).

Indianapolis Railways, Inc., 110 North Illinois Street, Indianapolis, has let general contract to Lundhoff-Bicknell Co., 100

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YOU'VE got a good-sized investment in every man trained in your plant. So long as he is at his machine, working, he's valuable to you. At home, laid up with Oil Dermatitis, he's a total loss. Plainly, the thing to do is to protect him from this dreaded skin disease. The cost is secondary. You can easily guard your men against Oil Dermatitis with Derma-San. One pint, added to every 35 gallons of cutting lubricant kills pus-forming germs before they attack your workers. Derma-San protection is worth many times its cost. Order a drum—today.

Derma-San is also ideal for all general plant sanitation

The HUNTINGTON LABORATORIES Inc.
DENVER HUNTINGTON, INDIANA TORONTO

North LaSalle Street, Chicago, for three buildings for motor bus shop, service and maintenance, and storage, comprising one-story machine shop, 165 x 365 ft.; one-story and basement service and transportation building, 70 x 225 ft., and three-story and basement storage and distributing building, 156 x 300 ft. Cost close to $750,000 with equipment. Herbert Foltz, Architects' and Builders' Building, Indianapolis, is architect; Bevington-Williams, Inc., Indiana Pythian Building, is consulting engineer.

MIDDLE WEST

Everson Mfg. Co., 627 West Lake Street, Chicago, manufacturer of water filters, coolers and kindred equipment, has leased a two-story and basement industrial building at 214-16 West Huron Street, about 15,000 sq. ft. floor space, and will remodel for plant, expanding present capacity.

Chicago Park District, Administration Building, Leif Ericson Drive, Chicago, will ask bids soon for addition to power house in Lincoln Park. Cost about $225,000 with equipment. Neiler, Rich & Co., 431 South Dearborn Street, are consulting engineers.

Airo Supply Co., 410 North Wells Street, Chicago, manufacturer of refrigeration parts and allied equipment, has leased one-story building at 1726-28 North Ashland Avenue, about 10,000 sq. ft. floor space, for plant, expanding present capacity.

Quartermaster, Fort Des Moines, Des Moines, Iowa, asks bids until March 1 for three automatic coal feed stokers (Proposal 251-42).

Armour & Co., Union Stock Yards, Chicago, has asked bids on general contract for new plant at South Omaha, Neb., consisting of three main buildings, six, four and three stories, respectively. Cost close to $750,000 with equipment.

Bureau of Reclamation, Custom House, Denver, asks bids until March 3 for one liquid-gas storage and gasifying plant, gas distribution piping system, 21 gas-fired non-insulated storage water heaters, gas meters and accessory equipment for Government project at Marshall Ford Dam, Colorado River, Tex. (Specifications 885-D).

Board of Trustees, Minneapolis-St. Paul Sanitary District, Administration Building, Sewage Treatment Plant, Childs Road, St. Paul, Minn., asks bids until March 8 for pneumatic conveying equipment and auxiliaries for sewage treatment works, Pig's Eye Island; also for mechanical equipment and appurtenances for screen and grit chamber superstructure and chemical tower and for electrical equipment, including conduits, switchboards and accessories for same structures.

Illinois Watch Case Co., Dundee Avenue, Elgin, Ill., has let general contract to Charles E. Giertz & Son, McBride Building, for one-story addition, 70 x 100 ft. Cost close to $50,000 with equipment. George E. Morris, Sherwin Building, is architect.

Kimberly-Clark Corp., Neenah, Wis., manufacturer of paper and paper products, has announced appropriation of $500,000 for enlargement of paper specialties department of Lakeview mill, Neenah. This is in addition to $1,000,000 plant expansion and improvement instituted in 1936 and about to be completed.

Eau Claire, Wis., County Board plans immediate reconstruction of highway commission headquarters building costing about $100,000, to replace unit wrecked by fire, Feb. 11. Shop equipment was ruined.

Modine Mfg. Co., Racine, Wis., manufacturer of heating radiators, space heaters, cooling radiators, etc., has acquired half interest in Syncromatic Air Conditioning Corp., 3373 North Holton Street, Milwaukee, but no immediate change in production plans is contemplated. C. R. McCallum is president of Milwaukee firm, and A. B. Modine of Racine company.

West Allis, Wis., Board of Vocational Education has accepted bid of Hunzinger Construction Co., 1827 North Thirtieth Street, Milwaukee, for construction of $100,000 addition to vocational school as PWA project, to add four new industrial shops beyond present curriculum. Equipment remains to be contracted for. Harry S. Belman is director.

Heil Co., 3000 West Montana Street, Milwaukee, manufacturer of tanks, steel motor truck bodies, hydraulic hoists, bottling machines, etc., has placed general contract with Klug & Smith Co., 111 East Wisconsin Avenue, for erecting shop extension, 100 x 335 ft., part two stories, with two crane runways. Investment, including equipment, is estimated at $250,000.

Green Lake County Board, Green Lake, Wis., has applied for PWA grant of $24,345 toward construction of highway storage and maintenance shop, 80 x 160 ft., to cost about $54,100. W. C. Weeks, 720 Ontario Avenue, Sheboygan, Wis., is architect. Gustave Doepke is county clerk.

Chippewa Falls, Wis., Board of Education closes bids Feb. 26 for new vocational school, 50 x 150 ft., three stories and basement, designed by Howard M. Nelson, architect, 204 East Grand Avenue, Eau Claire, Wis., and estimated to cost $130,000. John J. Nibble is secretary.

Milwaukee Electric Railway & Light Co., Milwaukee, will take bids soon for addition to North Edison Street steam generating station, costing $1,283,000, including high pressure boiler and Allis-Chalmers back pressure turbo-generator. Gould W. Van Derzee is vice-president and general manager.

Seaman Body Corp., 3880 North Richards Street, Milwaukee, wholly owned subsidiary of Nash Motors Co., Kenosha, Wis., has announced appropriation of $150,000 for new presses, welding equipment, etc., to be installed by May 1.

SOUTHWEST

Sunray Oil Co., Philtower Building, Tulsa, Okla., plans extensions in oil refinery at Allen, Okla., including additional cracking machinery in gasoline division and other equipment. Steel tank storage facilities will be increased. Cost close to $150,000 with equipment.

United States Engineer Office, Manufacturers' Exchange Building, Kansas City, Mo., asks bids until March 3 for one cast steel elbow (Circular 447).

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, has let general contract to Hiram Elliott Construction Co., 1016 Baltimore Street, Kansas City, Mo., for one and two-story branch plant, 160 x 500 ft., at North Kansas City, part of structure for bulk storage and distribution. Cost about $225,000 with equipment. Keene & Simpson, Land Bank Building, Kansas City, are architects.

Board of Education, Oberlin, Kan., plans manual training equipment in new two-story high school, for which bids will be asked on general contract in spring. Cost about $250,000. Special election has been called March 3 to approve bonds for $150,000, remainder of fund to be secured through other financing. Joseph W. Radotinsky, Commercial National Bank Building, Kansas City, Kan., is architect.

Gulf States Utilities Co., Beaumont, Tex., plans expansion and improvements in main steam-electric generating station on Neches River, near Beaumont, including new 25,000-kw. turbo-generator unit, 2500-kw. generator for auxiliary service, 45,000-hp. tandem compound steam turbine unit, condenser, high-pressure boilers and other equipment. Cost over $1,500,000.

Barnsdall Refining Corp., Tulsa, Okla., plans new oil refinery on large tract now being acquired at Corpus Christi, Tex., comprising several one and multi-story units, with steel tank storage and distribution department, machine shop, boiler plant and other divisions. Cost about $500,000 with equipment.

Dixon Packing Co., 108 Milam Street, Houston, Tex., food packer, has plans for first unit of new plant on tract recently acquired near Calhoun Road and Houston Belt Line Railway, to be two stories, 60 x 225 ft. Cost about $75,000 with equipment. Two other units will be erected later, entire project to cost in excess of $160,000.

MICHIGAN DISTRICT

Clayton & Lambert Mfg. Co., 11111 French Road, Detroit, manufacturer of metal stampings, blow torches and kindred products, has let general contract to Austin Co., Curtis Building, for one-story addition, 110 x 281 ft. Cost close to $100,000 with equipment.

Pioneer Foundry Co., Ltd., Jackson, Mich., manufacturer of gray iron castings, has let general contract to North-Moller Co., Jackson, for one-story addition. Cost about $30,000 with equipment.

Vento Steel Sash Co., Muskegon, Mich., is considering extensions and improvements in plant, including new units and equipment. Cost close to $100,000.

Hydraulic Devices, Inc., 45 East Baltimore Street, Detroit, manufacturer of mechanical equipment and parts, has revised plans for one-story addition. Cost close to $35,000 with equipment. Lyle F. Zisler, 5757 Cass Street, is architect.

Michigan Bakeries, Inc., Grand Rapids, Mich., has let general contract to Owen-Ames-Kimball Co., Grand Rapids, for one-story addition. Cost about $80,000 with ovens, conveyors and other mechanical equipment.

Consumers Power Co., Jackson, Mich., is arranging fund of $11,800,000 for expansion and improvements in power plants, system and properties during 1937. Of this amount, about $4,000,000 will be used for new steam-electric generating plants, including station on Saginaw Bay, near Bay City. New transmission lines will cost about $350,000, while fund of $1,200,000 will be used for improvements in present high-tension lines, power substations and switching stations; approximately $3,700,000 will be used for new primary and secondary lines for rural electrification, including service facilities.

PACIFIC COAST

North American Aviation Co., 5701 Imperial Highway, Los Angeles, manufacturer of airplanes and parts, has awarded general contract to Austin Co. of California, 777 East Washington Street, for one-story addition to plant at Los Angeles Municipal Airport, first noted address, 300 x 450 ft. Cost close to $250,000 with equipment. Niles Werner, Douglas Building, is engineer. Company is a unit of General Motors Corp.

Johnson Steel & Wire Co., Worcester, Mass., has awarded general contract to Myers Brothers, 3407 San Fernando Road, Los Angeles, for new Pacific Coast plant in industrial district of Los Angeles, one-story, about 10,000 sq. ft. floor space. Cost close to $45,000 with equipment.

Bureau of Reclamation, Custom House, Denver, asks bids until March 8 for two 6 x 7½ ft. pressure gate assemblies and one 3¼ x 3¼ ft. gate assembly for outlet works at Caballo Dam, Rio Grande Project, New Mexico, and at Grassy Lake Dam, Upper Snake River project, Idaho (Specifications 723).

General Tool Co., 328 N.W. Broadway, Portland, manufacturer of tools and mechanical equipment, has let general contract to Reimers & Jolivette, Railway Exchange Building, for one-story plant unit, 50 x 100 ft., primarily for storage and distribution. Lee Thomas, Inc., Weatherly Building, is architect.

Amalgamated Sugar Co., Ogden, Utah, has acquired about 185 acres near Nyssa, Ore., for new beet sugar mill, with power house, machine shop and other structures. Cost over $1,500,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 2 for high-speed twist drills (Schedule 1032); until March 5, motor-driven universal tool and cutter grinder (Schedule 1033) for Puget Sound Navy Yard; until March 2, 24 motor-driven diesel engine-operated oil supply pumps and spare parts (Schedule 1011) for Puget Sound and Mare Island yards; one motor-driven grinder with exhauster equipment (Schedule 1029); until March 9, motor-driven engraving machine with cutter (Schedule 1028) for Keyport, Wash., yard; until March 5, parts for airplanes (Schedule 900-572) for San Diego Naval Air Station.

S. & W. Fine Foods, Inc., Fourth and Berry Streets, San Francisco, has asked bids on general contract for one-story bulk storage and distributing plant at Oakland, Cal., where site has been acquired. Cost about $70,000 with conveyors, loaders, trucks and other mechanical-handling equipment. Jesse Rosenwald, 525 Market Street, San Francisco, is consulting engineer.

FOREIGN

Commonwealth Aircraft Corp., Pty., Ltd., Melbourne, Victoria, Australia, is concluding purchase of large tract in Fisherman's Bend district, near Melbourne, for new aircraft plant, including parts manufacture and assembling. Work will begin early in spring. Cost over $500,000 with equipment.

Government Railway Department, Government of Austria, Vienna, is arranging 1937 program for railroad electrification. New work will include electrification of western main line leading to Vienna and several other lines in urban and rural districts. A new Government loan totaling about $45,000,000 is being authorized, considerable part of fund to be used for work noted, including power stations, feeder lines and other operating facilities.

Thunder Bay Paper Co., Ltd., Port Arthur, Ont., has approved plans for expansion and improvements in pulp and paper mills, including new mill units, replacements in present equipment and installation of new machinery. Cost over $500,000 with equipment. Company is operated by Abitibi Power & Paper Co., Ltd., 408 University Avenue, Toronto, Ont.